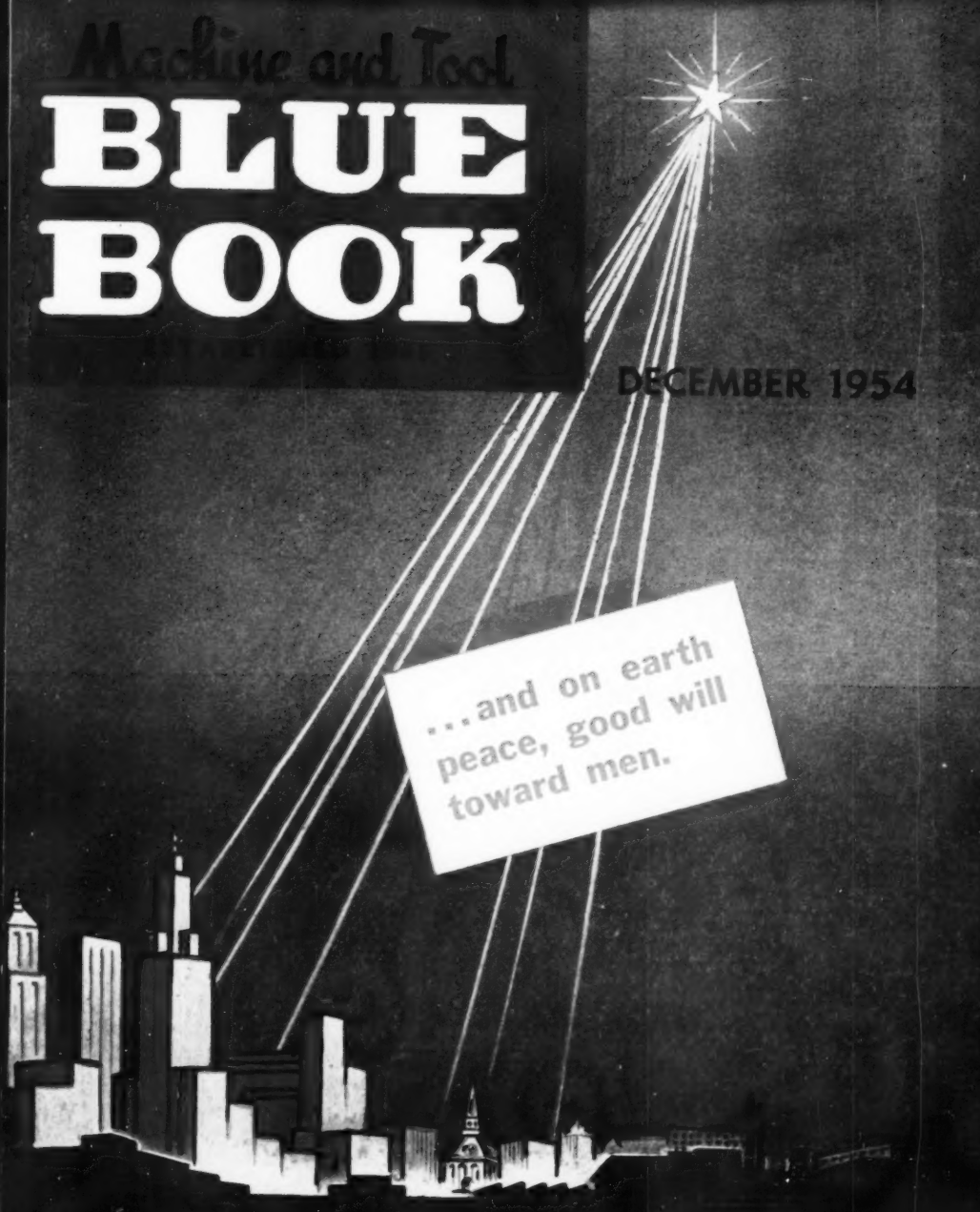
Machine and Tool

BLUE BOOK

DECEMBER 1954



A HITCHCOCK PUBLICATION

CONTENTS ON PAGE 5

Features Essential to Top Hack Saw Blade Performance

UNBREAKABLE—to saw FASTER.

Composite construction (a narrow high speed steel tooth edge electrically welded by the MARVEL-invented process to a tough, non-brittle alloy steel body), means that MARVEL high-speed-edge can be subjected to the MAXIMUM feed pressure that any hack sawing machine is capable of applying. MARVEL blades need not be "babied" for fear of breakage!

SHATTERPROOF—for SAFETY.

MARVEL blades never shatter or "explode" as do the ordinary "brittle" blades shown at left which so often cause personal-injury accidents such as the loss of an eye or severe laceration and expensive damage to the sawing machine. Operators who use MARVEL blades exclusively soon "get the habit" to apply heavier feeds, greater blade tension, higher speeds—to do their work faster, because they know they are SAFE with MARVEL.

SHARPER, PREMIUM-STEEL TEETH—to wear LONGER.

Teeth are accurately machined by a MARVEL-invented process that assures sharper tooth points and positive uniformity of tooth shape and degree of set from end-to-end of every MARVEL blade. The steel used in the tooth edge is carefully selected from the finest high speed steels available throughout the world, regardless of cost or source—truly premium steels, without premium cost.

QUALITY CONTROL—to assure UNIFORMITY.

With more than a quarter century of *experience* in inventing, perfecting, and producing welded-edge hack saw blades, MARVEL has provided its own laboratory with the most modern metallurgical instruments and techniques known to the applicable sciences for the specific purpose of maintaining highest possible quality control. Coupled with rigid tests and meticulous inspection of every MARVEL blade, uniform quality is assured.

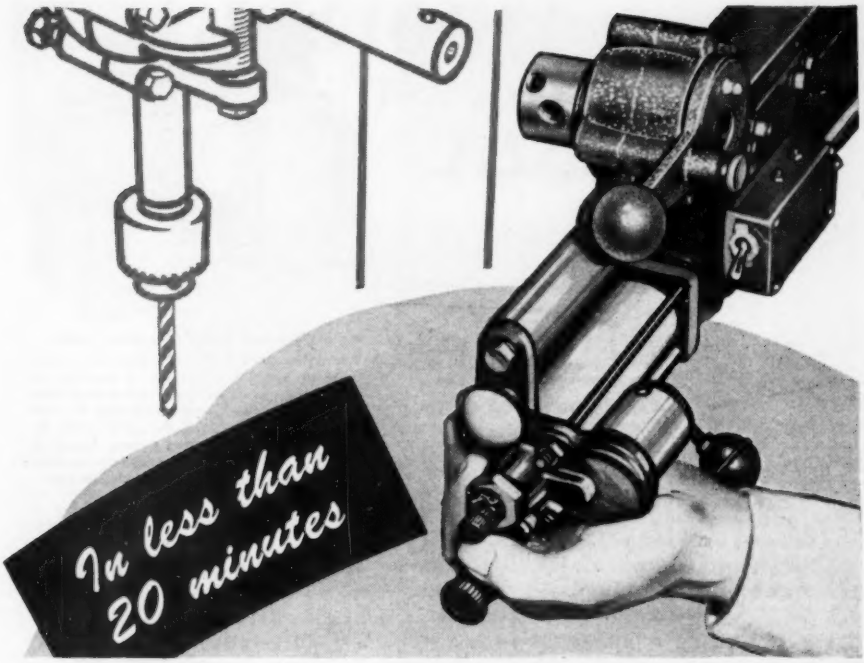
These are only a few features that make MARVEL High-Speed-Edge Blades such outstanding performers.

Ask for the latest MARVEL Cutting Tool Bulletin and the name of your closest MARVEL Distributor.

MARVEL Metal Cutting SAWS
Better Machines—Better Blades

Manufactured only by

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.



Yes, in less than twenty minutes, you can install a Bellows Drill Press Feed on your standard hand fed Drill Press and cut your cost of drilling holes often in half.

The Bellows Drill Press Feed attaches to the star wheel shaft of the drill press. At a touch of the operating lever, the Feed advances the cutting tool quickly to the work — feeds it into the work at a properly controlled feed rate and thrust — automatically returns the tool to starting position.

You save three ways: rapid advance and retract mean more parts per hour; controlled feeding of tool means fewer rejects, longer tool life; the reduction of operator fatigue means uniformly high production throughout the shift.

Write for Bulletin DF-110R
free on request

Address: Dept. MTB 1254
The Bellows Co., Akron 9, O.

The Bellows Co.

AKRON 9, OHIO

obsolete machines are

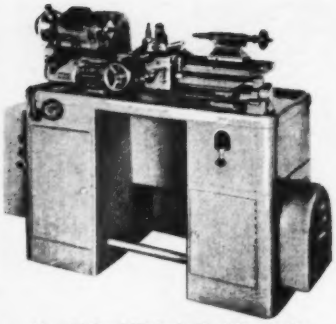
costing you plenty!

. . . you can make money

with these 4 Wade

precision machines

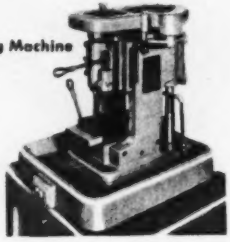
To keep pace with your competition, you need the latest, *most efficient* production machines you can buy. Here are four that are remarkably accurate — designed and built throughout for precision work to close tolerances. Some of the features on each machine are patented and exclusive. All machines are carefully described in Bulletins, available on request.

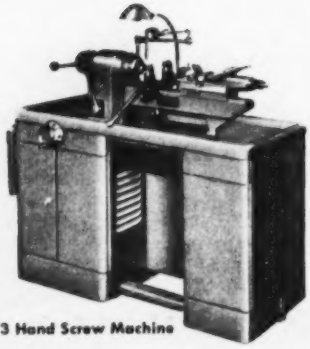


No. 8A Tool Maker's Precision Lathe

A variable speed feed for the feed rod is available as optional equipment. It provides an independent powered longitudinal or cross feed which permits the operator to change the rate of feed while the tool is under cut to secure the desired work finish during turning, facing or boring operations. The rate of feed for variable speed feed is controlled by a potentiometer.

Hand Profiling Machine





No. 73 Hand Screw Machine

No. 73 Standard Bench Lathe

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THE WADE TOOL CO.

WALTHAM 54 MASS U. S. A.

MAKERS OF PRECISION TOOLS FOR AMERICAN INDUSTRY

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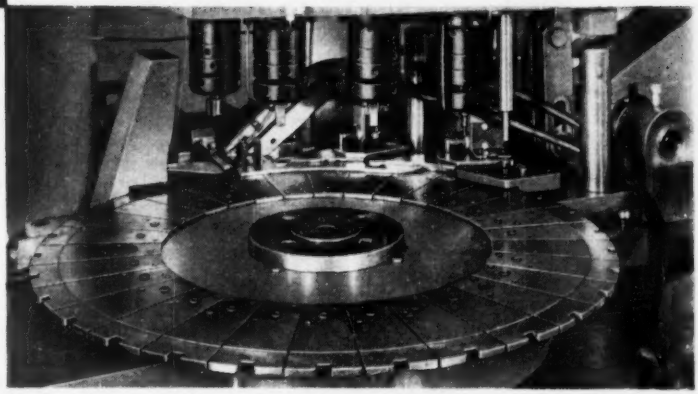
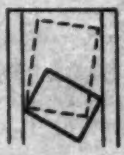


This equipped V & O press cold forms square nuts from round stock by patented method.

Built like machine tools, V & O presses feature long slide precision, hand-scraped accuracies on slides and bearings, all-around sturdiness and adaptability.

Expensive tools are protected, live longer. There's room for attachments and accessories. And back of the design is V & O's 65 years of experience in creating special presses, in engineering and building equipped units, in automation. Our engineers will be glad to discuss the application of V & O presses to your needs.

65th Anniversary



WHY THE V & O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide, the less the possibility for angular misalignment. And we keep our running clearances very close indeed.

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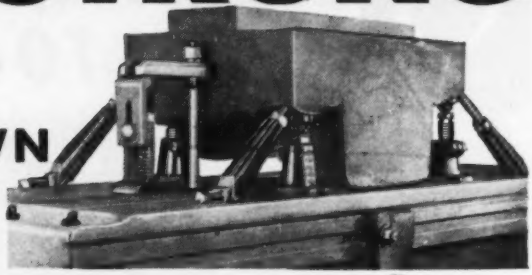
HUDSON, NEW YORK

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

ARMSTRONG

SET-UP *and* HOLD-DOWN TOOLS



PLANER JACKS

ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

NON-SKID JACKS

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down Tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

Write for Circular

ARMSTRONG BROS. TOOL CO.

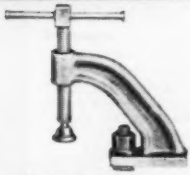
"The Tool Holder People"

5208 W. Armstrong Ave., Chicago 30, U. S. A.

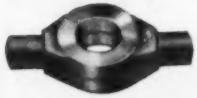
STEP BLOCK

UNIVERSAL CLAMP

T-SLOT BOLTS AND NUTS



T-SLOT CLAMP



STRAP CLAMPS

Contents for

Featured in this Issue 131
As the Editor Sees It 135
Letters to the Editor 138
Last Minute Washington News 141
How's Business? 149
"Know-How" REFERENCE SHEETS 296

FEATURED ARTICLES

Vacuum Metallizing . . . New Low Cost Method of Finishing Metal Products by J. Gordon Seiter 157
New Template Duplicator, by Frank Charity 175
Multiple Clamps for Jigs and Fixtures, by Tom Brown 181
Time Study, part 5, by Harold R. Nissley 191
Cutting Force: Its Effect on Machine Design, Workpiece, Positioning, Maintenance by Horace A. Frommelt 198
Adhesive-Setting Jig is Transportable, by George Middlebury 215
Carbide Broaching Future Appears Bright, by E. H. Graf and Cam Morawski 236
Management Communicates Ideas Through the Spoken Word, by George Allison 243
New Drawing Board Increases Output, by Clifford T. Bower 290

MODERN TOOLS IN ACTION

Precision Tap Maker Chooses Unit Dust Collector Over Central System for Seven Universal Grinders 227
Multiple Tooling in Automotive Part Manufacture 230
Throw Away Carbide Inserts Provide Inexpensive Regrinding 230
"Shaper of Turnpikes" 232
Use Multiple Carbides on First Cast Steel Crankshafts 233
Gripping Dogs Bite Longer with Flame-plated Teeth 234

SHOP HINTS

Making Accurate Tapered Plugs 219
Greater Safety for Handling Bar Stock 220
Splash Shield with Closing Feature 220
Modelmaker's Aid 221
Chamfering Guide 221
Holding Work 222
Simple Gage Sets Drills to Depth 222
Simple Drill Supporting Tool 222
Length Gage Saves Time 224
V-Block Device Aids Welders 288
Safety Hooks for Shafts is Self-Opening 288

DEPARTMENTS

News of the Industry 257
What's New in Metalworking 299
Available Literature 323
Mechanics Through the Ages 370
The Market Place 372
Products Index 374
Index to Advertisers 381

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Hitchcock Managers are Listed on Page 64

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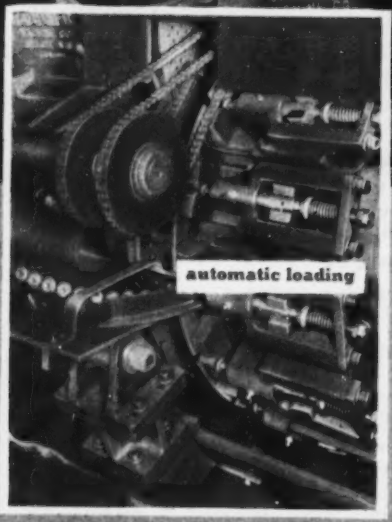
BPA

Semi-Automatic Gardner Disc Grinder

Grinds 1500 Spindle Ends Per Hour



work data	
MACHINE	Gardner No. 122-23" Single Spindle Grinder.
PART	Cotton picker spindle.
PRODUCTION	1500 per hour.
STOCK REMOVAL	5/32" maximum.
TOLERANCE	.004" for uniformity.
TOOLING	Vee-notched rotary work carrier with gravity-type magazine feed and double chain hold-down.
ABRASIVE	Gardner Yellow Rim Wire-Lokt Disc.

GARDNER MACHINE COMPANY
436 Gardner St., Beloit, Wisconsin, U. S. A.

GARDNER

precision disc grinders

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- **DISTRIBUTOR SERVICE**—Hundreds of Mac-it distributors from coast to coast insure immediate attention to all screw requirements.

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Manufactured by Mac-it Parts Co., Lancaster, Pa.

Everyone is talking about the NEW CINCINNATI TOOLMASTER MILLING MACHINE

Style 1B Toolmaster Milling Machine. Equipped with 1 hp spindle head; collet chuck type spindle nose, capacity 1/8" to 1" shank cutters; power feed to quill; worm positioning of swivel head.

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES

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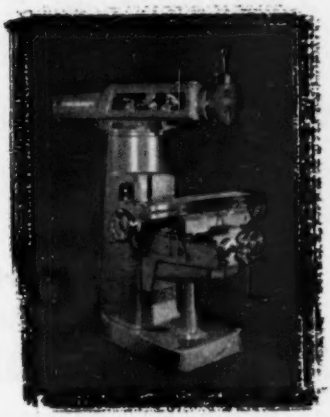
Style 1B Toolmaster Milling Machine. Cincinnati rectangular overarm, square gibbed saddle-knee bearing, extra wide knee bearing on column face . . . these and other features constitute exceptionally sturdy construction for maximum hp cuts.



Style 1C Toolmaster Milling Machine. Equipped with 2 hp heavy duty spindle head; built-in motor; 8 spindle speeds; No. 40 standard spindle nose.

Meet the newest member of Cincinnati Milling's extensive line of machine tools . . . the Toolmaster. There are three styles of these sturdy toolroom milling machines:

1A—Manual feed to quill
1B—Power feed to quill
1C—Heavy duty spindle head

Toolmaster Milling Machines constitute a new opportunity to reduce costs in shops of all sizes; in toolrooms, metal pattern shops, contract machine shops, tool and die shops. You can depend upon any machine tool bearing the name plate of The Cincinnati Milling Machine Co. Would you like to know more about this new Toolmaster? Write for new four-color catalog, No. M-1870.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

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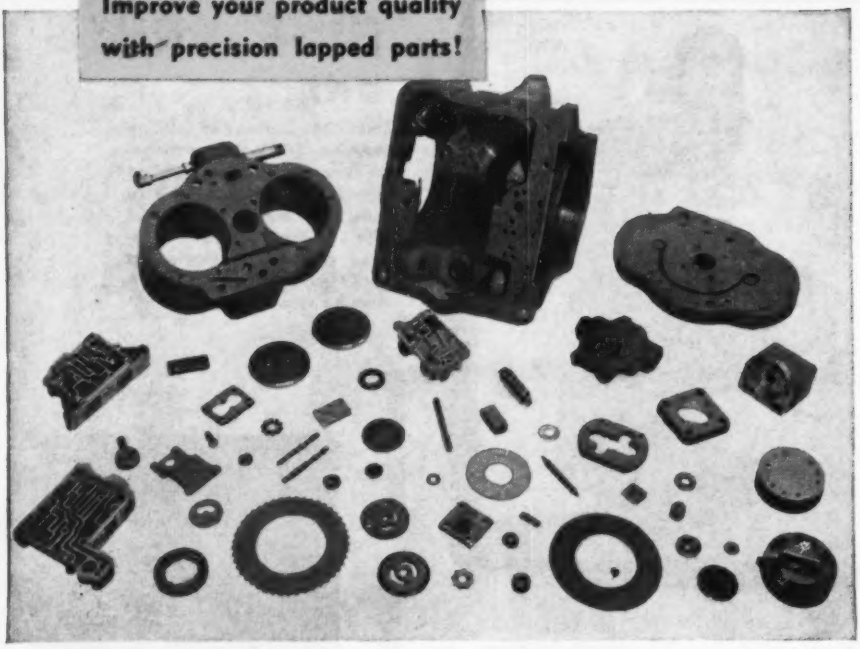

Enlarged Norton job lapping service

Complete and modern in every detail, the new Norton Job Lapping Department is ready to finish parts to your exact specifications.

Here, Norton machines for every type of lapping are operated by expert personnel. Results are checked on the latest inspection equipment, while precision accuracy is further assured by careful atmosphere control. Extensive job-range covers the following:

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Workpiece Capacities — Flat work up to 24" across. Cylindrical work from 1/16" diameter by 1/2" long to 2" diameter by 8" long.

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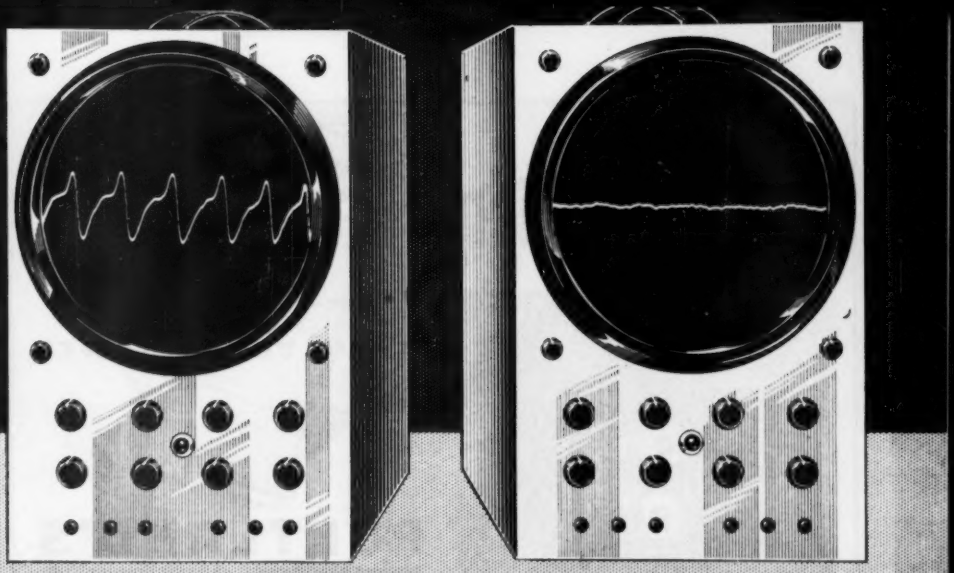

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TEST PROVES SUNOCO WAY LUBRICANT ENDS SLIP-STICK TABLE MOTION

How effectively Sunoco Way Lubricant stops slip-stick table motion is graphically illustrated by these oscillograms. The pattern on the left was made with a straight mineral oil as the lubricant; the other was made with Sunoco Way Lubricant on the ways. The patterns on the oscilloscopes are magnifications of changes in rate of table travel and were obtained under identical operating conditions.

You can stop slip-stick table motion, protect the ways, get better surface finishes, cut production losses with Sunoco Way Lubricant. Try it in your shop. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MT-12.

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- Designed for right and left hand, horizontal and vertical operation
- Horsepower ratings available from 10 to 100

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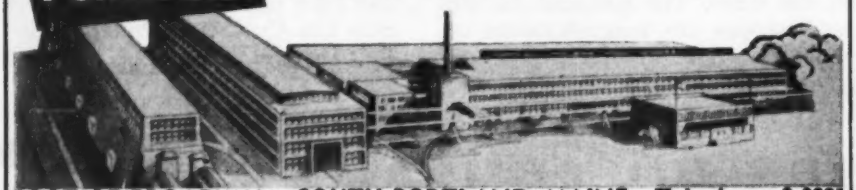

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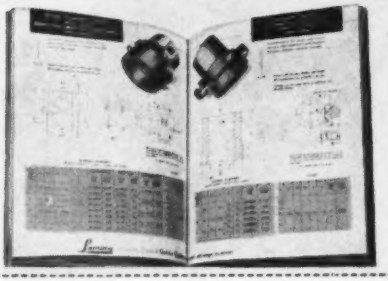

facts

This new 12-page Lamina catalog contains the key to longer die life, reduced downtime and fewer part rejects. It shows you how Lamina Bushings and Pins provide a precision combination that assures better die alignment, thousands of extra press strokes, lower production costs and more consistent quality on stamped parts.

figures

Easy-to-read dimensions, line drawings and actual photographs make selection of the proper guide bushing and pins an easy task. Prices on all types, sizes and materials are clearly listed. Send for your free copy.

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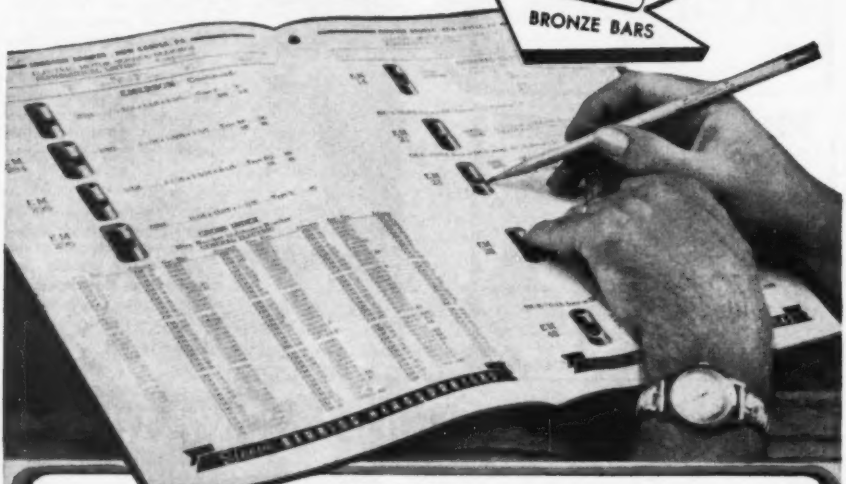
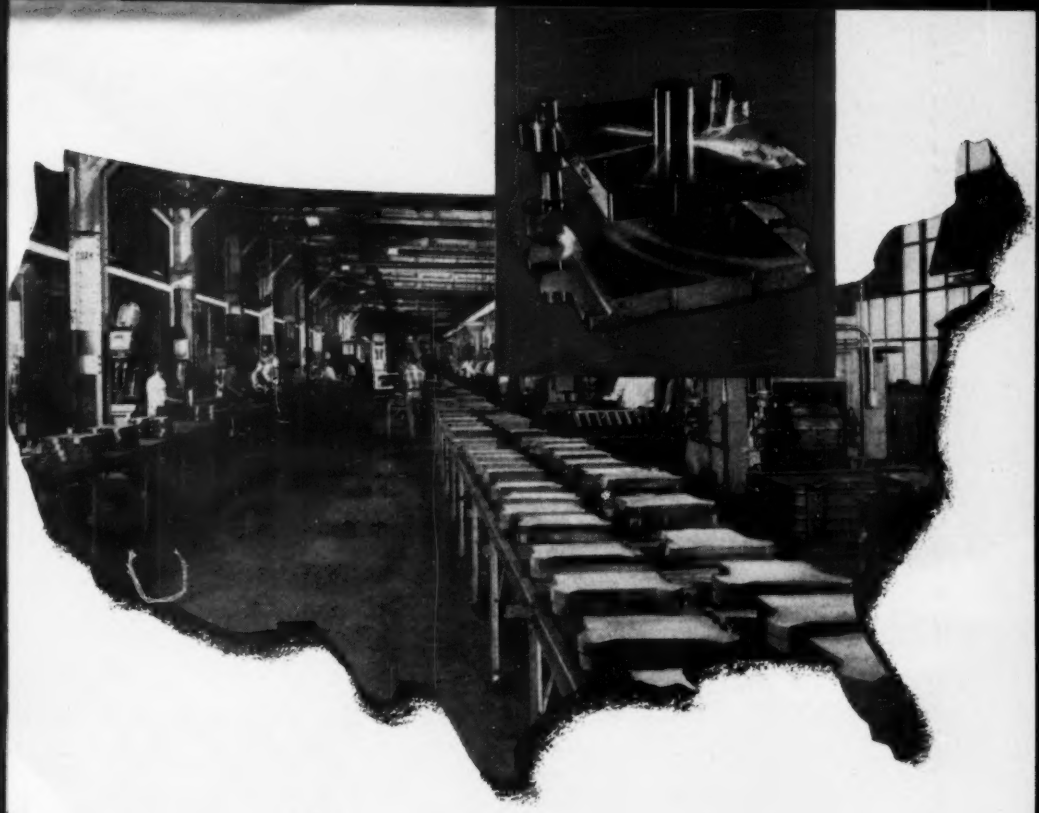


JOHNSON JB BEARINGS
Sleeve-Type

SLEEVE BEARING HEADQUARTERS SINCE 1901



Here's the "how" of the fastest Die Set Service ever

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CLEVELAND 14	1550 East 33rd Street
DAYTON 7	3196 Delphos Avenue
DETROIT 16	1549 Temple Avenue
GRAND RAPIDS	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
LONG ISLAND CITY 1	47-28 37th Street
LOS ANGELES 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
PHILADELPHIA 40	511 W. Courtland Street
ROCHESTER 6	33 Rutter Street
ST. LOUIS 8, Mo.	3740 Washington Blvd.
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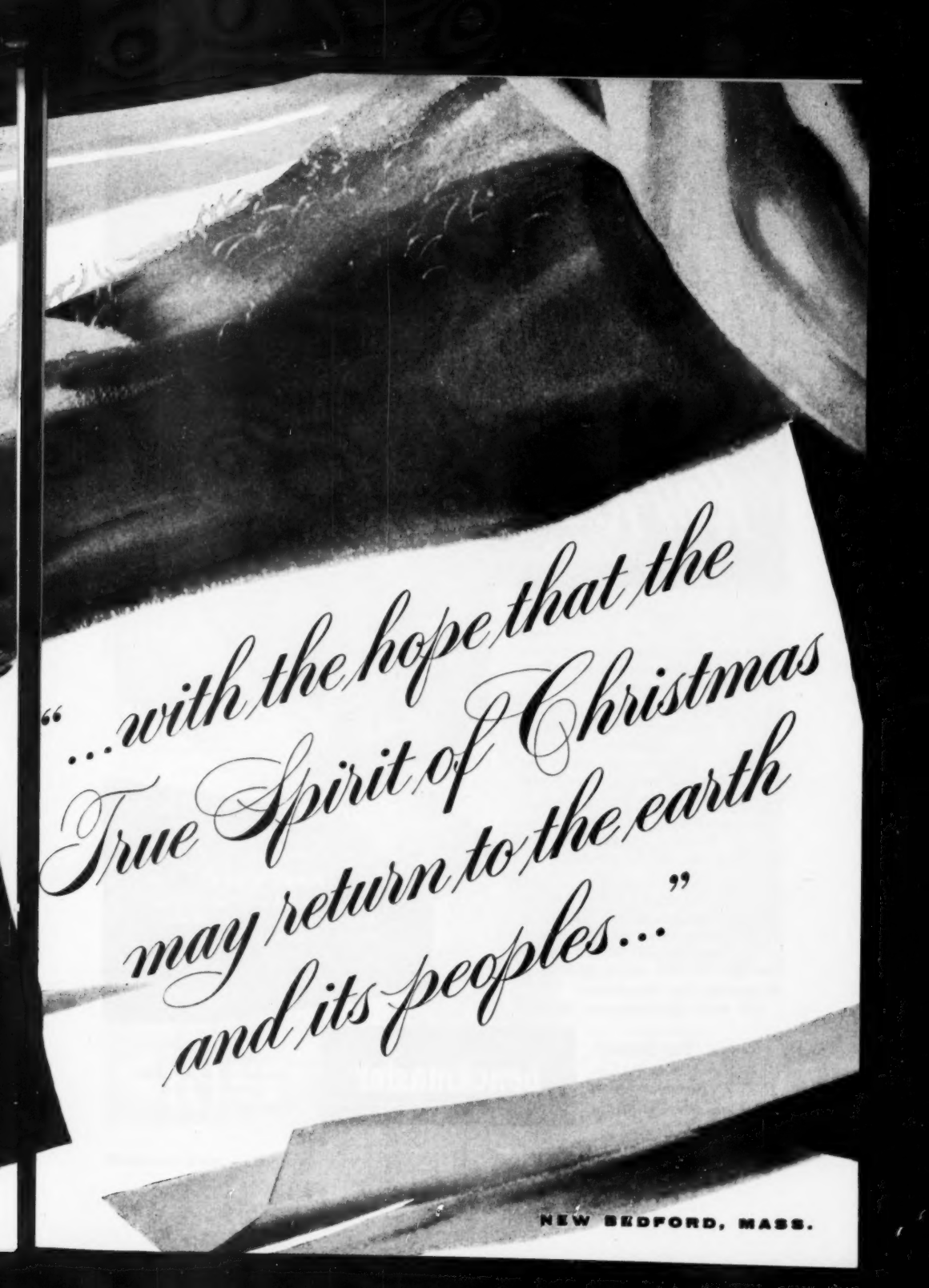
STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

MORSE TWIST DRILL AND MACHINE COMPANY


"...with the hope that the
True Spirit of Christmas
may return to the earth
and its peoples..."
NEW BEDFORD, MASS.

Why use a Koil-Kradle?

IMPROVED AUTOMATION FOR PUNCH PRESSES, SHEARS, SLITTERS, ROLL FORMERS and all similar machines fabricating from any coiled stock.

benchmaster

Koil-Kradle

with VARI-LOOP Control

KOIL-KRADLE makes available a *controlled length of slack loop* from which any machine can draw ...shuts off automatically when loop exceeds machine requirements.

KOIL-KRADLE CUTS COSTS! Uses much larger coils; lowers stock costs; eliminates frequent reloading. This means more press time, more production, more profit.

LICKS LOADING PROBLEMS—No heavy lifting, no time-consuming problems... simply roll coil up ramp into cradle position.

SAVES VALUABLE FLOOR SPACE—No need for 8 to 10 feet of wasted space...KOIL-KRADLE butts against any machine it supplies. Compact, occupies only a few feet of floor space itself!

Write for free circular or see your Benchmaster dealer.

MANY SIZES:
Capacities from ½ ton to 8 tons, coil dias. 36" to 60", stock widths 10" to 48".

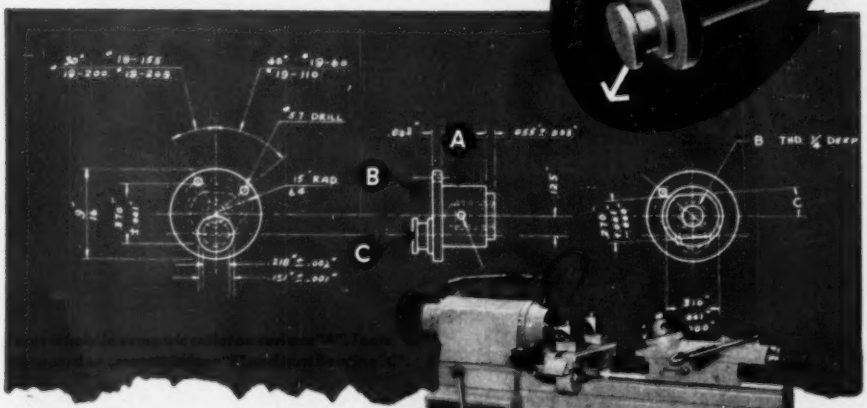
Benchmaster Manufacturing Co.
1835 W. Rosecrans Ave.
Gardena, California

benchmaster

World's largest manufacturer of small punch presses and mills.

INSTANT START-STOP

boosts Penn Fishing Tackle parts to 250 per hour!



Penn Fishing Tackle Mfg. Co. went fishing to catch ideas for stepping up production of eccentric parts. The Rivett 918 "Steelway" Cabinet Turret Lathe with its production drive proved ideal for their needs.

This production drive features "split-second" starting and stopping of the spindle by movement of the lever chuck closer handle. With one forward pull, the operator closes collet on work, releases brake and engages spindle drive. When lever is pushed back, spindle drive is disengaged, brake mechanism is applied and work is released.

A 918 "Steelway" can boost your production, too! Why not go fishing and see what savings can be caught!

Model 918
"Steelway" Cabinet Turret Lathe

← *Production drive.*
Motor runs continuously regardless of number of times spindle is started and stopped.

RIVETT

LATHE & GRINDER, Inc.

Dept. MTR12 Brighton 35, Boston, Mass.

in MILL HEADS

RUSNOK

Builds the BEST Quality at the BEST Price

¼ H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1½" to 3".
⅜" end mill capacity.

$245.00

RUSNOK

½ H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

RUSNOK

RUSNOK TOOL WORKS
4840 West North Ave., Chicago 39, Ill.
DEALERS IN ALL PRINCIPAL CITIES

MILLING • DRILLING • BORING

Each year more and more firms are discovering COMTORPLUG

"PACKAGED PRECISION"

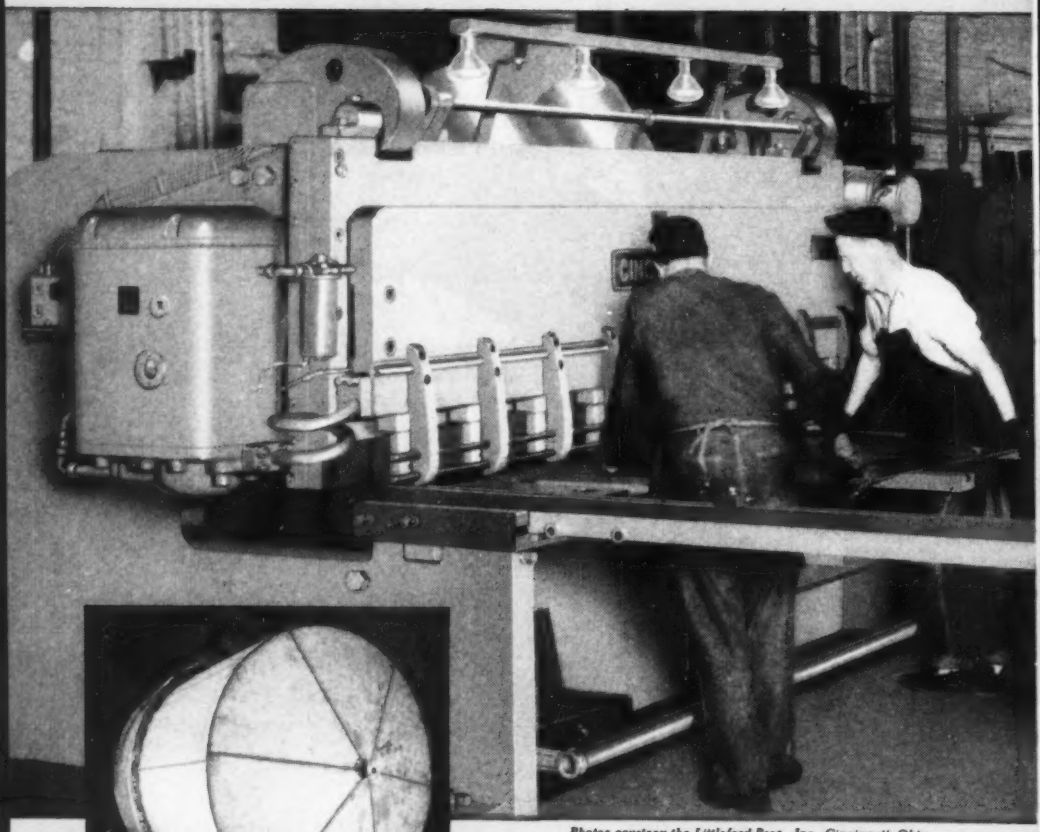
NEEDS NO WIRES, HOSE, ELECTRONIC GEAR OR HEAVY BASE

REQUEST NEW BULLETIN NO. 48

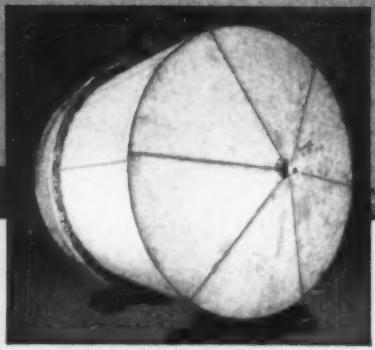
COMTOR CO. 49 FARWELL ST., WALTHAM 54, MASS.

They handle the job faster with

CINCINNATI

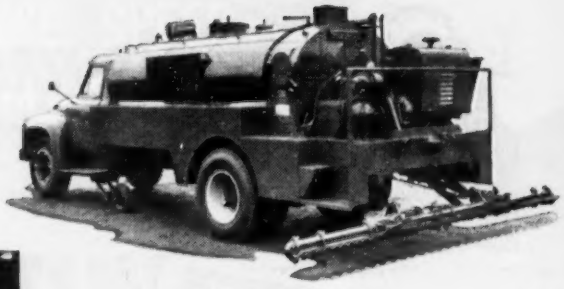


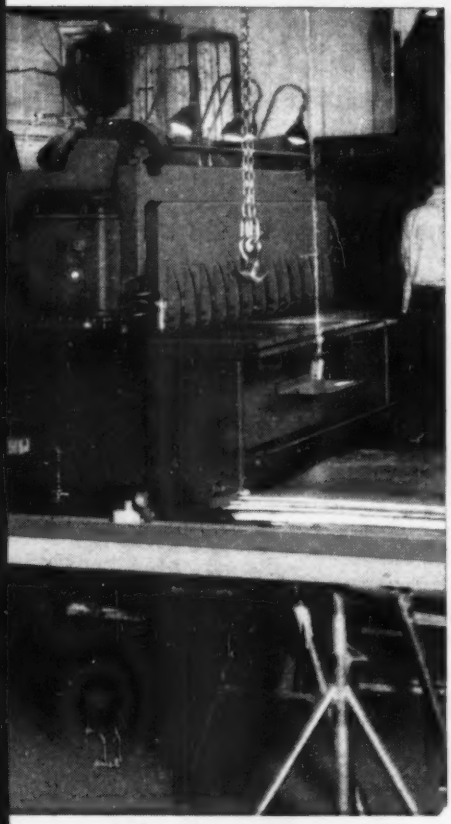
Photos courtesy the Littleford Bros., Inc., Cincinnati, Ohio.



Shearing stainless steel for tanks in the Littleford Shops.

Shears...





at LITTLEFORDS...

"Faster handling—with a high degree of accuracy", say Littleford Bros.

Simple, rapid and positive gauging, with the accurate shearing performance of these Cincinnati Shears—gives a clean cut economical production, with long knife life and low maintenance."

Write for Shear Catalog S-6.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

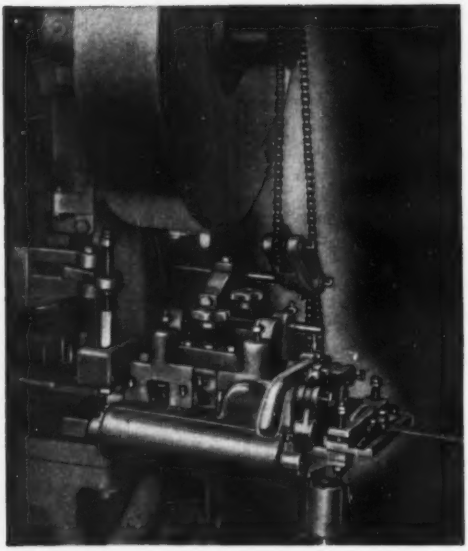
CINCINNATI

GET **RAPID-FIRE PRODUCTION**

from your PUNCH PRESSES

IT'S EASY WITH **WITTEK**

Automatic Roll Feeds



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and easily adjusted to meet individual job requirements.

4404

WITTEK Reel Stands

Simplify Handling of Coiled Stock

A choice of standard models is available to facilitate handling a large variety of coiled stock . . . from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

Write for full particulars

WITTEK Manufacturing Co.

4321 W. 24th Place, Chicago 23, Illinois

Automatic ROLL FEEDS AND REEL STANDS

For greater ACCURACY, RANGE, SPEED in grinding perforators!

A few examples of perforator shapes that can be made faster and easier with Grind-All.

Harig *Grind All* Fixture

Easier movement now possible with new pre-loaded ball bearing type of construction.

Patent No. 2449459

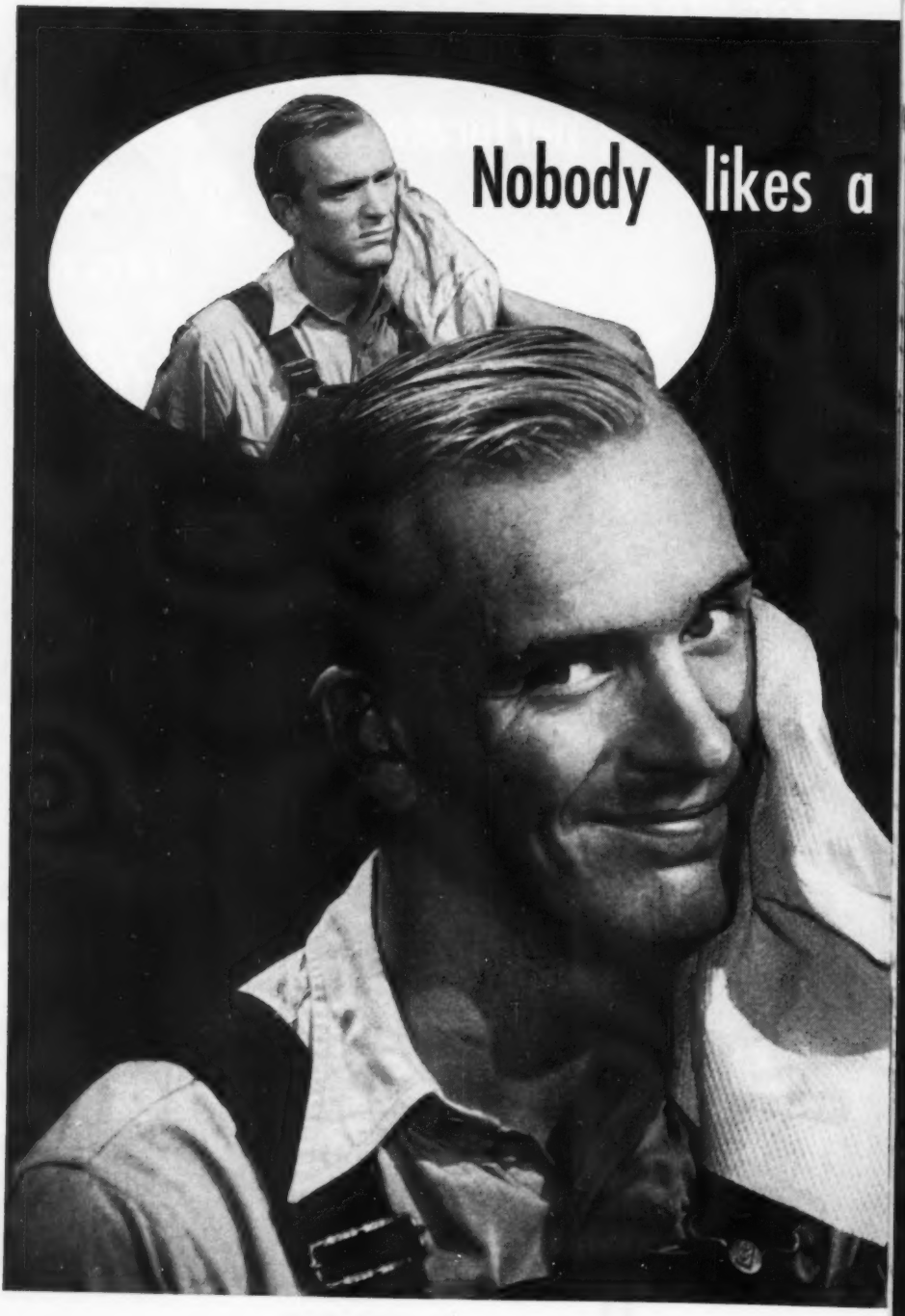
With the Harig Grind-All fixture, you make perforator grinding setups THREE TIMES FASTER — grind a variety of regular and irregular contours with the greatest possible accuracy and widest operating range. Exclusive radius generating feature makes fixture particularly adaptable to carbide grinding.

For details on service and facilities, send for the fully illustrated Harig Catalog.

Harig

Manufacturing Corp.

8700 W. Bradley St., Chicago 34, Ill.


Nobody likes a

dirty | wiper

...Another good reason for switching to **Scott Wipers!**

Scott Wipers are sanitary and disposable. They provide protection for your men and greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials. They end the laundering problem and simplify distribution and control.

Scott Industrial Wipers are two-ply and tough yet soft and absorbent. Compare them with whatever wiping material you're using now—for cost, for convenience, for performance.

, , ,

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Co., Dept. MT-3, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name_____

Position_____

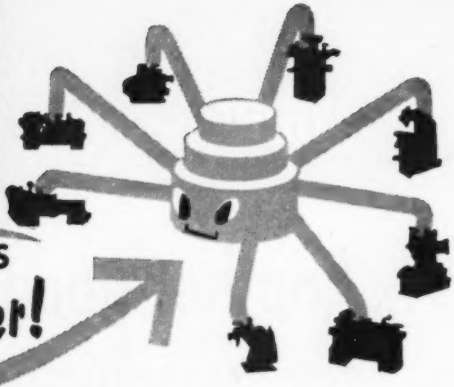
Company_____

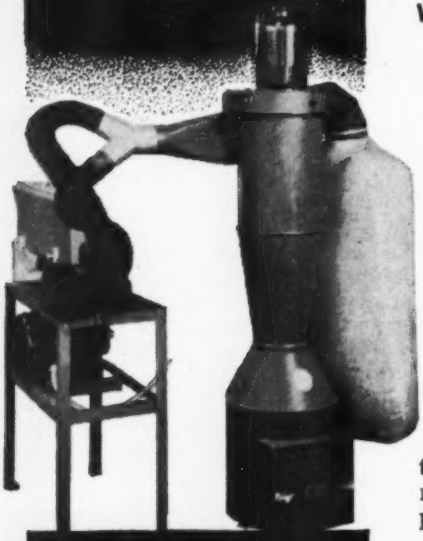
Address_____

City_____ State_____

TORIT
UNITIZED
DUST CONTROL

ELIMINATES *the Spider!*





With Torit Unitized Dust Control You . . .

- ✓ get custom installed units tailored to each dust creating machine.
- ✓ eliminate bother, expense and overhead of centralized control.
- ✓ operate units only when necessary.
- ✓ eliminate waste of power and suction by machines not operating.
- ✓ eliminate the dust problem at its source . . . where it should be stopped.

Furthermore, Torit designs these units to suit *your* requirements. No matter what your dust problem, Torit can solve it.

Our engineers will be happy to call on you, without obligation on your part, to show you how you can use Torit Unitized Dust Control to your advantage in plant efficiency and ultimate profits.

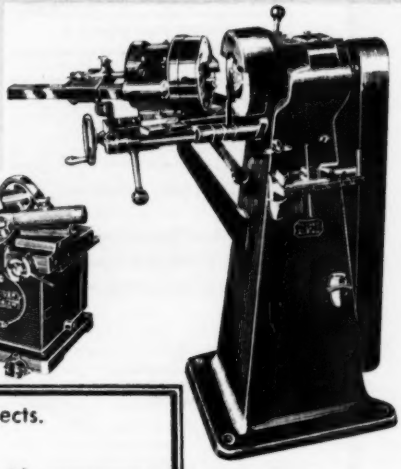
See our catalog in Sweet's Machine Tool File, or write:

TORIT
MANUFACTURING COMPANY
303 WALNUT STREET, ST. PAUL 2, MINN.

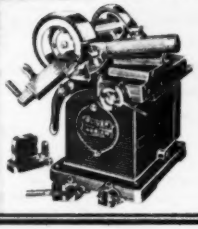
Point the Way to LONGER LIFE FOR YOUR DRILLS with OLIVER DRILL POINTERS

Twist drills machine-ground the Oliver Way not only last up to 3 times longer than hand-ground drills but also cut faster and more accurately.

OLIVER DRILL POINTERS are so efficient that they grind uniformly all drills to a perfect balance—each lip of the drill doing equal work. This great accomplishment is due to a unique OLIVER feature—the ability to give you the *only* scientifically correct and theoretically perfect drill point.



Longer wearing life for drills assures economy and efficiency. Remove your drills at the first sign of dullness . . . machine-grind them with OLIVER DRILL POINTERS and



- **Eliminate** imperfect holes and rejects.
- **Minimize** drill costs.
- **Maintain** production schedules with assurance.

No. 510 for drills ¼" to 3"—2-3-4 flute. Variable clearances. Variable point angles. Automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet
"How To Produce More Holes With Your Drills!"
See our catalog in Sweet's Directory

OLIVER INSTRUMENT CO.
1408 E. MAUMEE • ADRIAN, MICHIGAN

MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

NOW IS THE TIME TO STOCK SEIBERT PRECISION MULTIPLE SPINDLE DRILLING EQUIPMENT

SEIBERT

A cross section of SEIBERT production tools of engineered perfection and certified quality. Many other spindles can be duplicated from your specifications. Consult SEIBERT for savings in time and money.

Quality **MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS**

for complete details write, phone, or wire

SEIBERT & SONS INC.
CHENOA, ILLINOIS

Time Saving Production and Checking Accessories

Here are three Sundstrand accessories that may prove helpful in your work. A wide range of bench centers and balancing tools are available for checking purposes. The automatic index base has proved a sound addition to many metal working machines. Write for further information.

Bench Centers

For Precision Checking

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

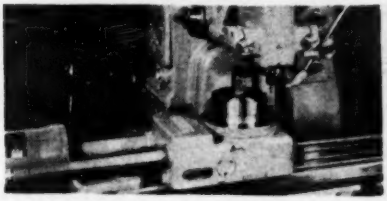
COMPLETE RANGE AS FOLLOWS:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Balancing Tools For Small Medium or Large Work

Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

Automatic Index Base For More Production



This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

In many cases, the addition of this Automatic index base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this.

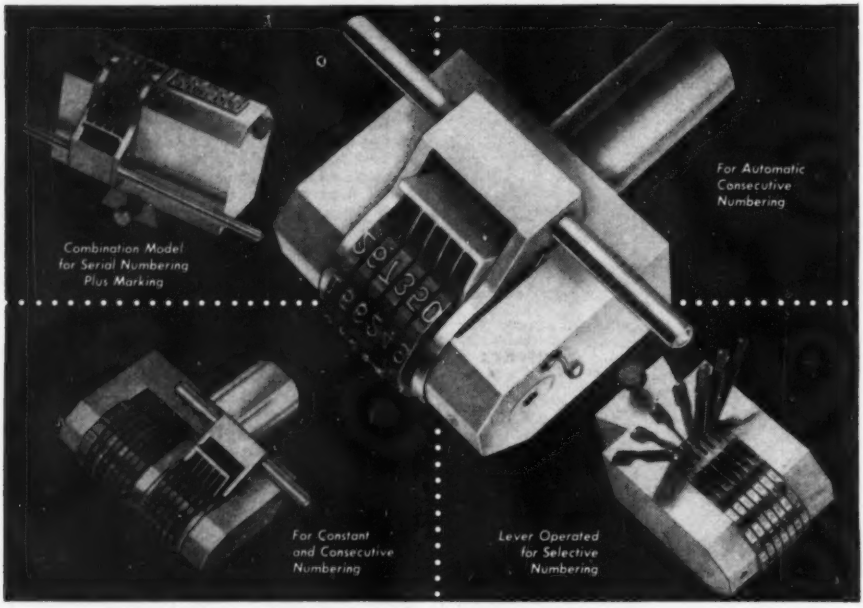
Free Data

Complete specifications are available on these three time saving accessories. Write for your copies today. Ask for bulletins 451

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.

2535 ELEVENTH ST., ROCKFORD, ILLINOIS, U.S.A.


Combination Model for Serial Numbering Plus Marking
For Automatic Consecutive Numbering
For Constant and Consecutive Numbering
Lever Operated for Selective Numbering

NOBLEWEST *Precision Numbering Heads*

1 2 3 4 5 6
1 2 3 4 5 7
1 2 3 4 5 8
1 2 3 4 5 9
1 2 3 4 6 0
1 2 3 4 6 1

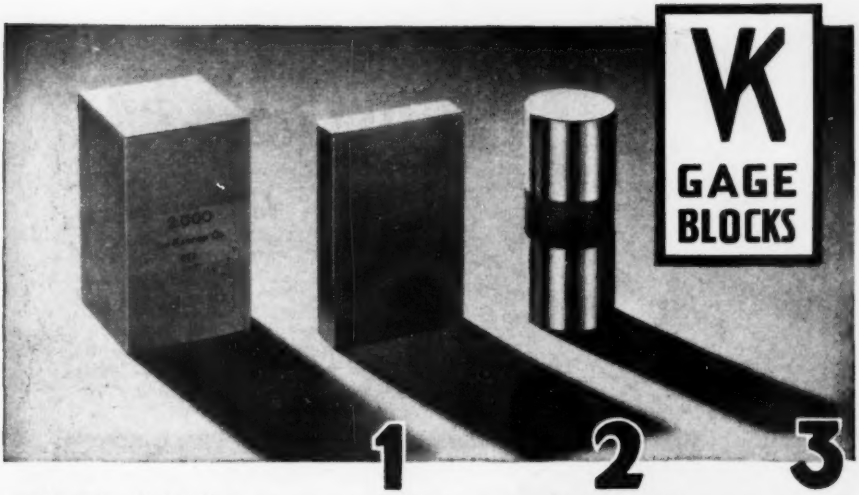
Fast, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for *constant, selective and consecutive* numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines — wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to ½". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies. Write to Noble & Westbrook Manufacturing Company, 9 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH

NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS



THREE WAYS *to protect production accuracy*

To meet closest limits of accuracy and protect production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS
2—RECTANGULAR REFERENCE GAGES
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are now made to an accuracy of 000008", and are desgned as workng gages for shop use . . . to put accuracy at the machine. Wearing surface of these ⅞" diameter gages is 40% greater than that of rectangular gage blocks hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No. 35, yours for the askng by wrtng: The Van Keuren Co., 177 Waltham St., Watertown, Mass.

VK
35th YEAR

THE *Van Keuren* CO.,

177 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages.

BOY! These Wheels Do Everything!

Just tell your dealer you want to try a couple of rubber-cushioned Brightboy wheels, that *burr, clean, finish, polish, in one operation.*

They'll save you up to 50% in finishing time on metals, plastics and laminated materials.

Like thousands of enthusiastic production men, you'll find applications for rubber-cushioned Brightboy that you never thought one abrasive could achieve. Its adaptability is amazing, going far beyond other methods. It gives you an entirely new, wider, refreshing concept of finishing.

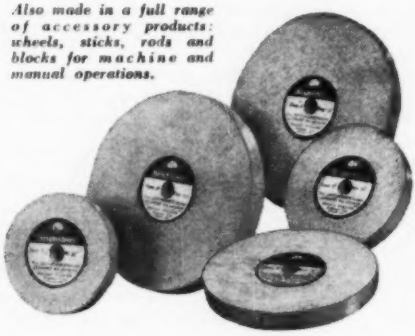
NEW!

Stock abrasives "matched" to your particular finishing requirements. Rubber-cushioned Brightboy now available in either aluminum oxide or silicon carbide grain
and—Each of these texture combinations comes in GRAIN SIZES ranging from EXTRA COARSE in SOFT, FIRM and TOUGH RUBBER BINDERS.

TRY A TEST!

Get all the facts on Brightboy rubber-cushioned finishing from your dealer. Ask him for Brightboy literature. Write us if he cannot supply you. Get our advice on any problem where finishing is involved.

Also made in a full range of accessory products: wheels, sticks, rods and blocks for machine and manual operations.



WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N.J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Strand
FLEXIBLE SHAFTS

FLEXIBLE SHAFT MACHINES... versatile finishing facilities— no costly fixed equipment!

You can grind, rotary file, wire brush, buff, polish and do many other preparation and finishing jobs with a single, portable machine when you install Strand Flexible Shaft Machines. Just change the tool to change the job. And changing tools is easy with Strand because the new Strand Quick Change Coupling eliminates threads, nuts, wrenches. Lock-button design does the trick—in seconds!

Operating speeds from 850 to 12000 RPM are available in the famous Strandflex 4 & 5-Speed Gear Drive Machines, powered up to 1 HP . . . and you can select your operating speed without changing pulleys or belts, without using tools. New Strand High Speed Gear Attachment gives operating speeds up to 27000 RPM, suitable for high speed steel or carbide cutters . . . by tripling the rated spindle speed.

Best of all, you are assured of better workmanship, higher output, less operator fatigue, because the operator lifts only the tool—not the heavy, bulky motor. And your Strand machine is portable—take it to any part of the plant where the work can be done best.

FREE CATALOG illustrates and describes all Strand units, including Strandflex machines, as well as conventional Direct Drive and Countershaft machines with up to 3 HP motors. See your Strand Distributor or write today for Catalog 231-A.

FRANKLIN BALMAR CORPORATION
N. A. STRAND DIVISION
Woodberry, Baltimore 11, Maryland
5001 N. Wolcott Ave., Chicago 40, Ill.

POPE

the leading builder of precision spindles

REPAIRS SPINDLES TOO

BELT DRIVEN — MOTORIZED — HIGH CYCLE

ANY SIZE — ANY MAKE

OF ANTI-FRICTION BEARING SPINDLE THAT IS REPAIRABLE

For precision grinding, milling or boring, Spindles must be in first class running condition to produce good work and more of it.

The place to have your Spindles built to their original performance is where Precision Spindles are built.

You can send your Spindles to us with CONFIDENCE, knowing the job will be done right the first time and at the lowest possible cost. Cost figures are submitted for your approval before we proceed with the work.

Spindles repaired and rebuilt by POPE are dynamically balanced to the same tolerances as new Spindles. This means better surface finishes and smoother running Spindles.

FOR FAST SERVICE,
THE RIGHT BEARINGS,
BETTER WORKMANSHIP AND
LUBRICATION, AT LOWER COST

Send your Spindle repair work to

No. 102

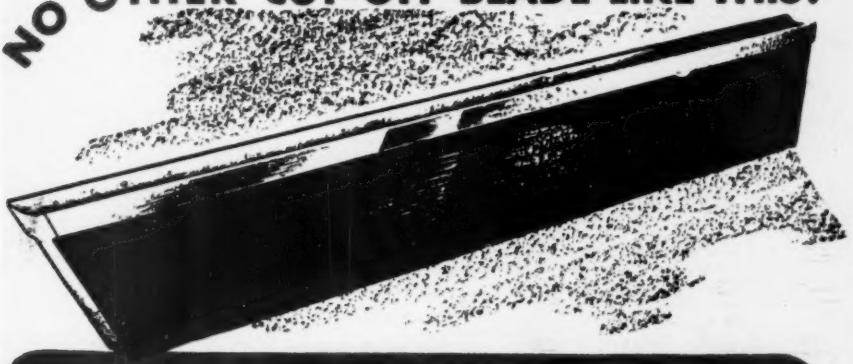
POPE MACHINERY CORPORATION

Established 1920

261 River St. • Haverhill, Massachusetts

ASK US TO MAIL YOU A COPY OF SPINDLE REPAIR BULLETIN R-1

NO OTHER CUT-OFF BLADE LIKE THIS!



None can do what EMPIRE'S

Luers Cutting-off Blade

will do

Empire Tool Co. is the LEADER in cut-off blade developments—backed by twenty years' experience in cut-off blade manufacture.

Cut-off blades are tools subject to conditions different from those of other tools and will perform most efficiently only when specialists' recommendations are followed.

Available from stock are blades of four types of high speed steels developed to meet the demands of cut-off operations. And on short notice you can get blades of cast alloys and tungsten carbide.

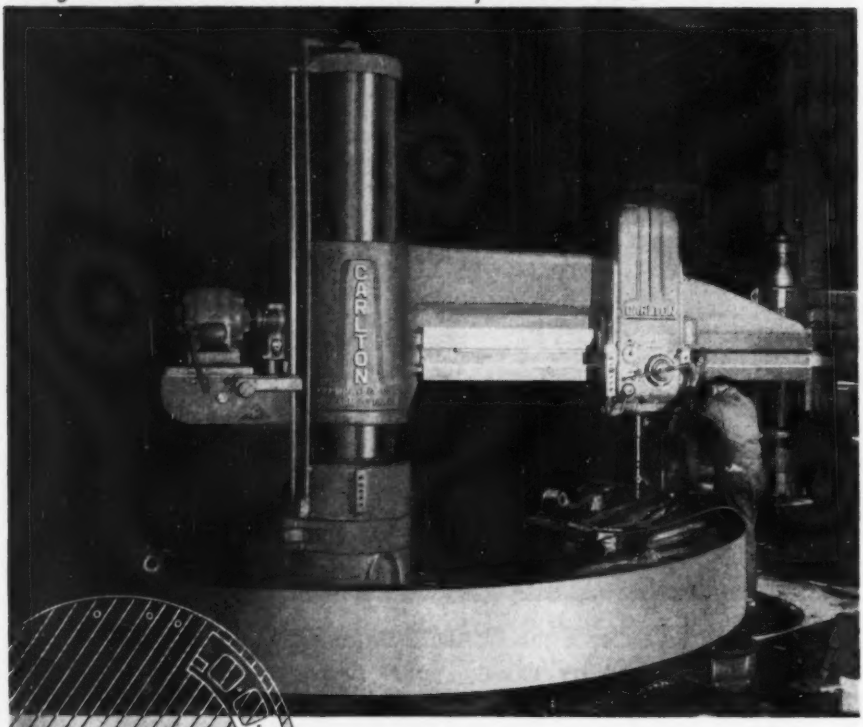
Made under license issued by John Milton Luers Patents, Inc.

Made in U.S.A.

EMPIRE TOOL COMPANY

8780 GRINNELL AVE. DETROIT 13, MICHIGAN

Only **ONE** *can be called the finest.....*



CARLTON GETS AROUND...

...drills even the most difficult jobs easily, quickly and efficiently

Enormous capacity of the Carlton 5A radial drill (10-ft. arm, 26" diameter column) allows you to drill all the holes in your large castings *at one setting*. This saving in reduced handling time is matched by precision accuracy – with Carlton you drill it right the first time.

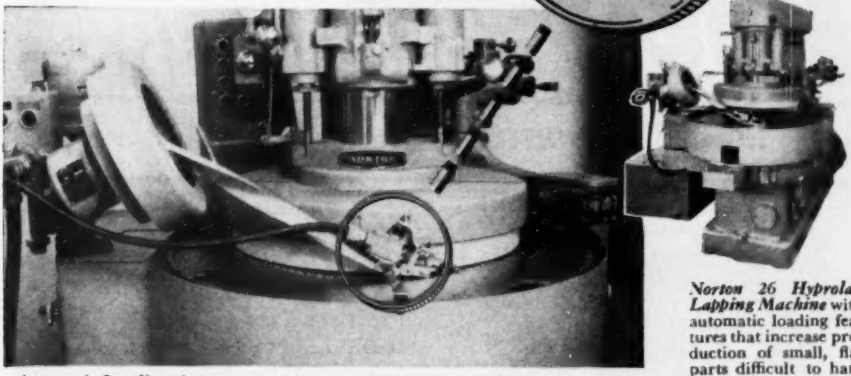
You benefit in many other ways with Carlton radial drills: pushbutton control, super-precision column clamp, low-hung drive, positive tooth feed clutch and easy, economical maintenance. Check Carlton and you'll buy Carlton, the completely modern radial drill. Arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26". Send today for descriptive bulletin. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Carlton

radial and horizontal drills

On small, flat parts the Norton Thru-Feed Lapper

brings 4 to 1 savings



Automatic Loading Arrangement of Norton 26 Hyprolap lapping machine makes sure parts are in correct position before entering feeding trough . . . prevents ganging up . . . directs work in a path that assures even lap wear.

Norton 26 Hyprolap Lapping Machine with automatic loading features that increase production of small, flat parts difficult to handle manually as much as 4 to 1 . . . as many as 8000 pcs/hr.

*NEW, built-in automatic loading adds extra advantages to Norton 26 Hyprolap**

Now you can make 4-to-1 savings in lapping small parts . . . and get top-quality results on every job. Investigate new Norton 26 Hyprolap lapping machines with the exclusive built-in thru-feed mechanism.

Here's why:

1. ***You speed up production.*** Loading and lapping operations handle parts as fast as 8,000 pieces per hour.
2. ***You cut handling.*** Loading and unloading are completely automatic.
3. ***You reduce downtime.*** Work path traverses the entire working surface of each lap . . . promoting even wear . . . reducing the frequency of lap dressing.
4. ***You cut out operations.*** This lapper removes stock down to .0002" tolerances . . . makes surfaces parallel to .000025" . . . in many instances without pre-grinding of parts.
5. ***You use less skilled help.*** Filling feed hoppers and removing finished-work baskets are the only manual operations.

No wonder 4-to-1 savings are a matter of record with the new Norton Hyprolap with built-in automatic loading!

Send for Bulletin 852-7. Also submit samples of your work for production estimates. Standard hopper-feed Hyprolap machines take work up to 1¼" diameter. Modifications handle larger work. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products . . . to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

over 35 YEARS of know-how is built into

Baldor

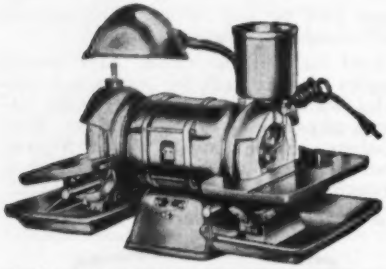
BALL-BEARING TOTALLY ENCLOSED HEAVY-DUTY

GRINDERS

6'' to 12'' WHEELS — bench and pedestal types

BALDOR 600 Series Grinder 1/3 h.p., 1 phase, 60 cy., 3450 rpm., 6" wheels. $49.00.

BALDOR is a basic manufacturer of grinders —even the motors (the heart of the unit) are built by Baldor. These grinders are built for heavy-duty, precision grinding in shops and factories. They are totally enclosed, protected against dust, dirt and grit. Rotors are dynamically balanced—and each grinding wheel is balanced. Ball-bearings are "sealed-for-life" type.



SPECIAL CARBIDE TOOL GRINDER built especially for sharpening carbide tools quickly and accurately. Reversible ½ h.p., motor withstands repeated overloads. $149.20

ASK FOR BULLETIN 321-J
on complete line of Grinders & Grinder-Buffers.

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BALDOR ELECTRIC COMPANY
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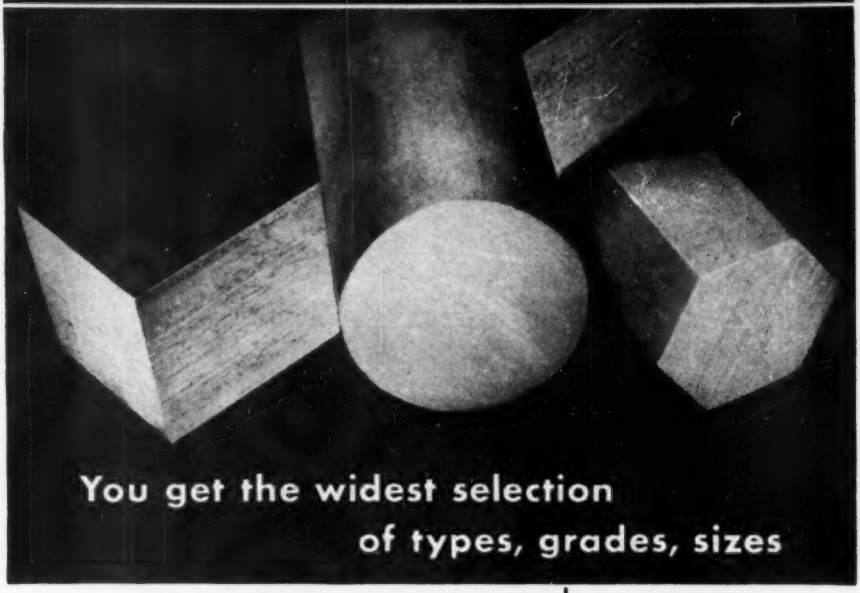
WHY IT PAYS TO BUY STAINLESS BARS FROM US



• You can greatly simplify your buying of stainless steel bars by calling the nearest U. S. Steel Supply warehouse. Our warehouses offer you the widest selection of top quality bars ready for immediate delivery. These bars are made from USS Stainless Steel—produced under the strictest quality control from ore to finished product—so you're sure of getting the exact grade you specify.

In addition our large stocks provide greater design freedom for your particular needs. And our experienced stainless men are at your disposal to help you select the best grade for the job . . . and even to help you with design problems.

Call us for USS Stainless bars—rounds, squares, hexagons, angles, channels—and for stainless sheets and strip, too.

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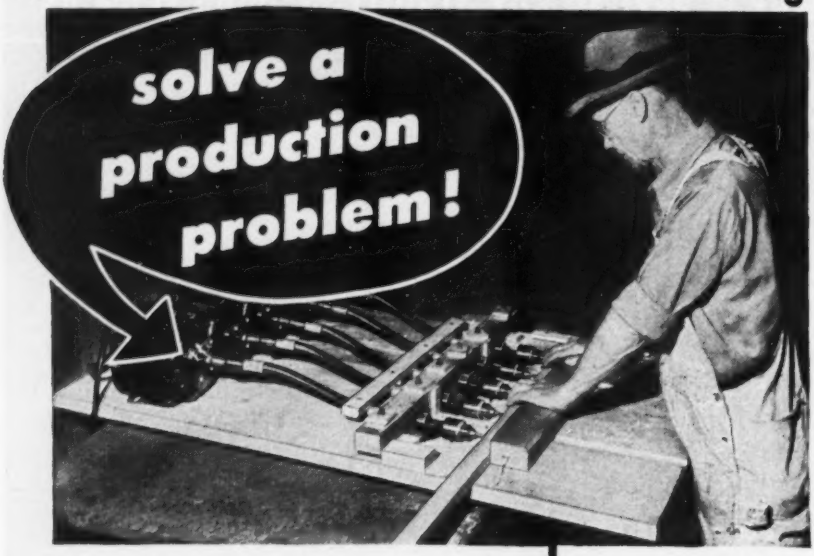
INGENUITY and STOW Flexible Shafting



THE H. T. Hunt Co., of Binghamton, New York, took a contract to make several thousand newspaper racks. One of the principal production problems involved in this job was the drilling of thousands of holes—which were at first drilled individually—using a templet. *This method was inefficient, costly, and time consuming.*

The Hunt Co. then decided to use five STOW tool shafts—driven by five ¼ HP motors—in the arrangement shown above, to drill five holes at once.

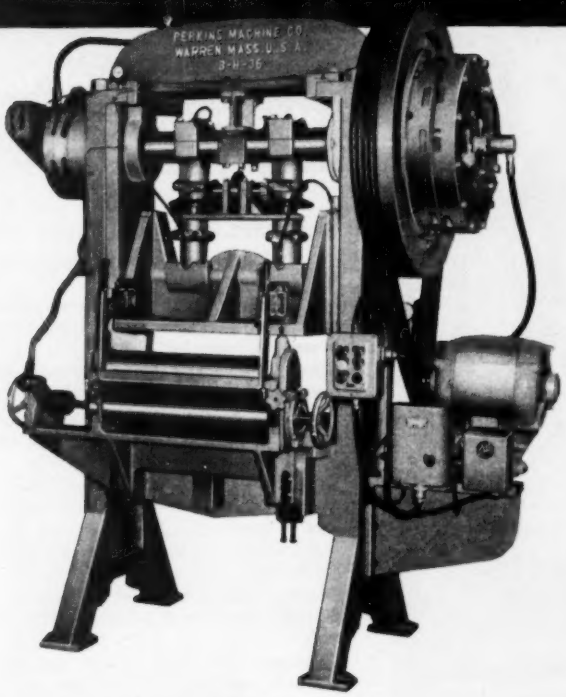
Perhaps your ingenuity—and a STOW flexible shaft machine can solve one of your production problems, or do a drilling, brushing, grinding or sanding job better!

STOW streamliner flexible shaft machine.

Write today for Catalog 51

STOW MANUFACTURING CO.
130 Shear St.
Binghamton, N. Y.

The PERKINS 3-H-36 PRESS



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PRESSES BUILT TO SPECIAL SPECIFICATIONS

Perkins Power Presses SINCE 1885

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WARREN, MASSACHUSETTS

Circle R Carbon Saws

do jobs too tough for HSS, not tough enough for Carbide

New CIRCOLOY Combines Advantages of other steels in general use

Fills the performance gap between carbide and high speed steels — lets you restrict use of carbide and HSS to uses they serve best.

Suited for tougher work but can be used for regular cutting jobs — because it outlasts HSS.

Longer life, longer production runs, superior cutting, does operations efficiently that HSS cannot handle satisfactorily.

Unlike carbide, needs no special handling — can be reground on any standard grinding apparatus.

New to market, but proved efficient and economical in production tests for over 1 year in plants all around the country.

Circoloy metal cutting saws, thickness 1/16" to 1/4", now offered in same line as our regular HSS circular cutting tools.

Developed through 30 years of experience producing the best available tools of high speed steel, solid tungsten carbide, carbide tipped.

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performance and features equal to or surpassing machines costing* up to 58% more!

MAKE YOUR OWN COMPARISON

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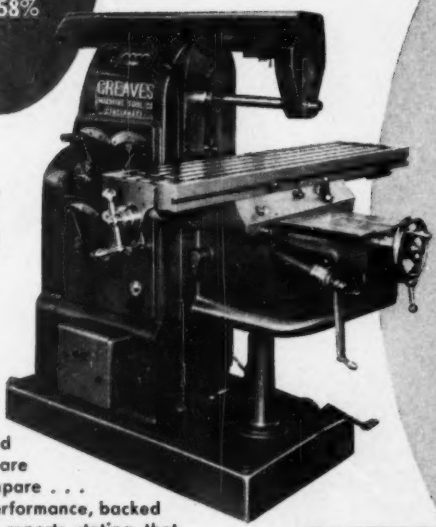
- T-Slots—number and width
- T-Slots—center distance
- Swivels
- Longitudinal Power Feed
- Cross Power Feed
- Vertical Power Feed
- Spindle Center Line to Top of Table—Max.
- Spindle Center Line to Top of Table—Min.
- Column to Brace
- Column to Inside Arbor Support
- Arbor to Underside of Overarm
- Taper Hole • Nose Diameter
- Hole Through Spindle
- Speeds • Speed Range
- Feeds • Feed Range
- Power • Weight



Ask about our Tool Lease and Deferred Payment plans.

Features and dimensions are easy to compare . . . and so is performance, backed up by user reports stating that Greaves 2H plain and universal milling machines outperform mills costing almost twice as much!

Before you buy any milling machine, send for your copy of the Greaves Comparison Chart. You'll find that the Greaves is full size, completely rugged, accurate and dependable . . . yet it sells for thousands of dollars less than comparable machines.

Write for your copy of this eye-opening comparison chart

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☐ **The Comparison Chart**
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COMPLETE LINE FROM 50 TO 775 TONS

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America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

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ALL STEEL PRESS BRAKES

"MULTI-MACHINE" VERSATILITY TO BOOST PRODUCTION

Practically limitless in their scope of forming, bending, punching, blanking and related operations, Niagara Press Brakes get more done for you because they do more jobs. One reason: Advanced design. Another: The extensive line of Niagara Press Brake Dies available.

UNIFORM BENDS WITH STRAIGHT-EDGE ACCURACY

Double end twin drives with double reduction gearing, *on all models*, provide uniform, constant application of power at both ends of the ram. Off-center loading presents no problem.

Rugged, streamlined frames feature box type crowns of unequaled strength and rigidity, assuring maximum resistance to deflection and permanent alignment of bearings and ram.

3-SHIFT STAMINA TO HANDLE WORK-HEAVY SCHEDULES

Close attention has been given to every design detail. Nothing has been overlooked. Each frame size has been scientifically tested to detect and eliminate harmful stresses at all critical points.

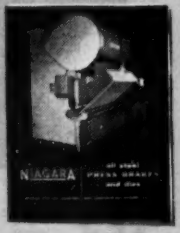
Laminated non-metallic ways, an exclusive Niagara feature, reduce wear to an absolute minimum, providing accurate alignment and longest possible service life. All gearing is totally enclosed in sealed oil baths for thorough, clean lubrication.

Once again, Niagara's forward-thinking engineering has produced a metal working machine years ahead of its time. As you become familiar with the significant developments embodied in this revolutionary new line of all steel press brakes, you will realize why it carries the Niagara nameplate. After all, who is more uniquely qualified to be its builder than the builder of America's most famed and most complete line of presses, shears, other machines and tools for plate and sheet metal work?

Call in your nearest Niagara representative at once. Let him tell you, *in detail*, what these great, new press brakes can do for you.

CHECK ALL THE FACTS, YOURSELF!

Compare. Make a careful, feature-by-feature appraisal of Niagara's years-ahead press brake design. Write for new Bulletin 89C . . the most comprehensive press brake literature ever published.



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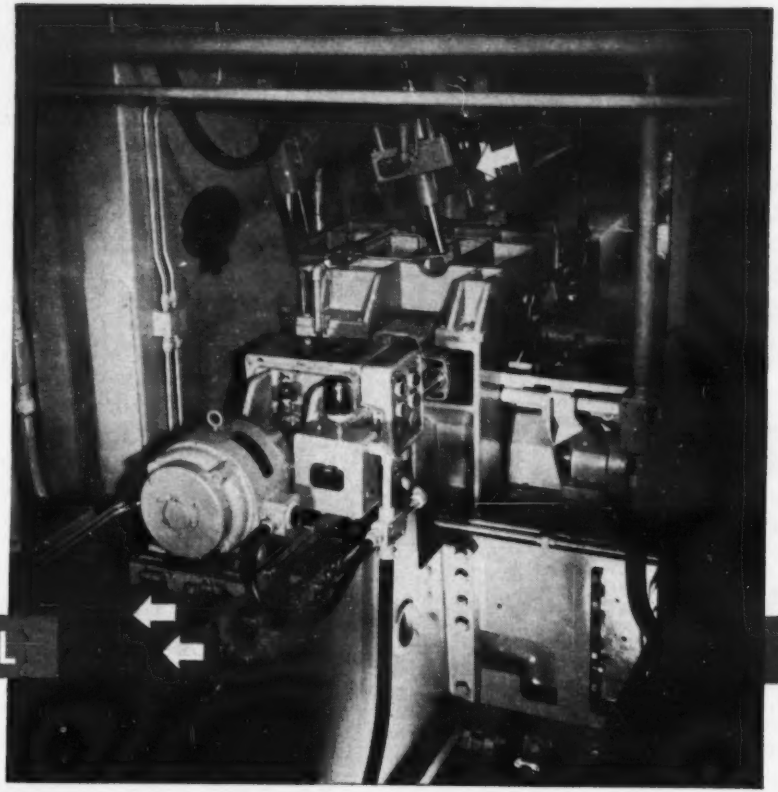
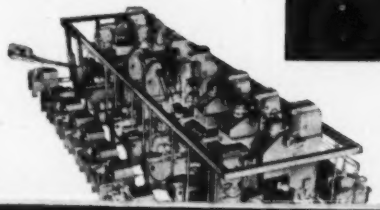
Auto Blocks An Hour!

WITH THE HELP OF

LUDLUM

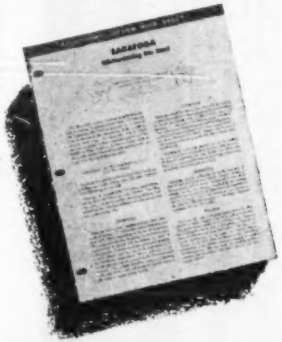
SARATOGA TOOL STEEL





Ludlum Saratoga was used for the steel ways (note arrows, above) of this giant unit, illustrated at left in a bird's-eye view reduced to miniature size.

Write for
BLUE SHEET ON SARATOGA



This concise four-page folder gives all needed handling and shop treatment details on Saratoga. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

Address Dept. MB-60

98 SEPARATE OPERATIONS are carried on by this versatile machine which turns out 50 V8 auto engine blocks an hour. It consists of 18 machining units, each of which is fitted with hardened and ground steel ways of Ludlum Saratoga to guarantee accuracy in production.

MILLING, TREPANNING, DRILLING, counterboring, reaming, chamfering, automatic inspection of holes for depth and removal of chips are the operations performed by this amazing mechanism.

LUDLUM SARATOGA WAS USED BECAUSE its extreme hardness, high resistance to wear, and excellent machinability more than met the customer's high requirements for maintaining accuracy in this huge, multi-station machine.

ALLEGHENY LUDLUM METALLURGICAL SERVICE can solve *your* tool or die steel problems. ● Call your local A-L representative or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

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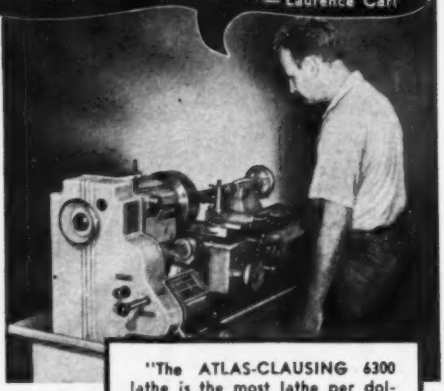
AL®
FINE TOOL STEELS
SINCE 1854

"most lathe per dollar invested"

— Laurence Carl



exclusive design features put CLAUSING 6300 12" HEAVY DUTY PRECISION LATHES in a class by themselves

On any basis of comparison, ATLAS-CLAUSING 6300 Series are standout values for efficient 24-hour production . . . tool room or research work. 8 speeds, 50 to 1300 RPM — 12¾" swing over bed, 7½" over saddle. 24" — 36" — 48" between centers — headstock, apron, and quick change gears run in baths of oil. Get all the facts from your ATLAS-CLAUSING Distributor.

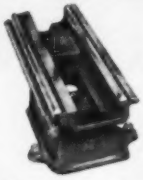
"The ATLAS-CLAUSING 6300 lathe is the most lathe per dollar invested available within its size range. Because of its in-built accuracy we are able to move spindle and nose fixtures from one lathe to another without affecting the accuracy of the product. The upkeep is unusually low and operators can deliver large production because of good control. It's a fine profit making machine."

Signed — Laurence Carl
Carl Manufacturing Company

The heavy, thick-walled grey-iron headstock is fully enclosed and all moving parts run in a pumped bath of oil. Spindle is forged, precision-ground steel with 1⅜" bore and 1" collet capacity . . . turns on heavy duty Timken precision tapered roller bearings. Hardened and ground spindle nose L-00 is tapered key-locked type. Spindle can be reversed without danger of the chucks coming off.

Drive is underneath, with spindle pulley mounted "outboard" — replacing belts is a quick, easy job. Dual A-belt drive assures full transmission of power.

Quick-change mechanism is enclosed . . . gears and shafts run in bath of oil. Provides instant selection of 48 threads or feeds. Feeds from .00065" to .036" per revolution of spindle, and right and left hand threads from 4 to 224.



Massive, semi-steel bed is 7⅜" wide, 5⅛" deep — thickly ribbed and braced. Vee-ways, flat ways and undersides are ground — all eight surfaces align to within .001".

Heavy, quick positioning tailstock. Permanently attached swing type wrench controls bed lock. Graduated ram is bored for No. 2 Morse taper.

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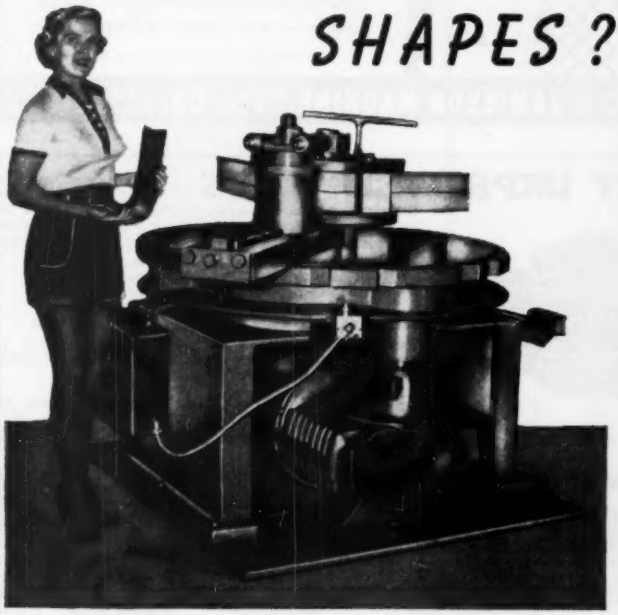

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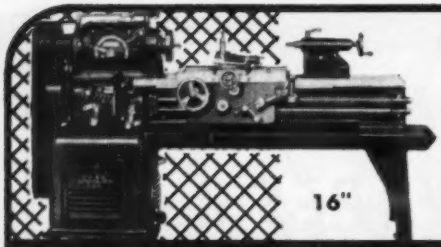
(Motor and all Electrical Equipment included)

Pedrick Production Benders are not only very satisfactory for bending pipes, tubes, etc., but may also be used to bend two structural angles simultaneously, as is shown in the picture. By merely changing the dies, most any bendable material can be bent in production quantities. Measured in pipe capacities, eight production benders are available up to and including 6-inch extra heavy pipe.

Write for descriptive folder, Dept. 3

PEDRICK TOOL & MACHINE CO.

3640 N. LAWRENCE ST., PHILADELPHIA 40, PA., U.S.A.



CARROLL AND JAMIESON LATHES

● This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin.

THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO U.S.A.

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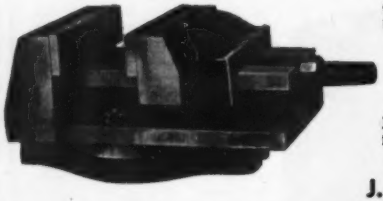

We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.

In ordering this vise give size of slot in table:
No. 10—6" jaws, 1½" deep, opens 5"
wt. 45 lbs. ..... $ 81.84
No. 20—10" jaws, 2¼" deep, opens 8½"
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Best material and workmanship. Prices are net f. o. b. Chicago. *Dealers' inquiries are solicited.*

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INDICATING MICROMETER COMPARATOR

has the VISIBLE feel

No Arguments as to correctness of reading due to "feel".

Use it as Comparator, Master Micrometer, Go & No Go Gage.

1" Range reading in 1/10,000"

To attain permanent accuracy at these close limits, highest precision workmanship and exclusive design of mechanism are of Major importance and ONLY found in "MASTER COMPAR".

A RIGHT HAND TOOL

Release button for movable Anvils on RIGHT Hand side enables you to hold tool the conventional way.

NEW — Resetting to Zero in 5 seconds:

Quick adjustable tolerance bands. Heavy TUNGSTEN CARBIDE Anvils will actually measure Out-of-Roundness, Ovalness and Taper.

0-1" SIZE IN HARDWOOD CASE

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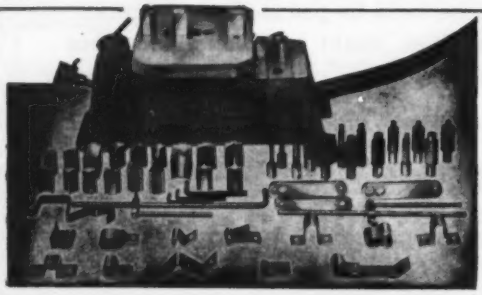


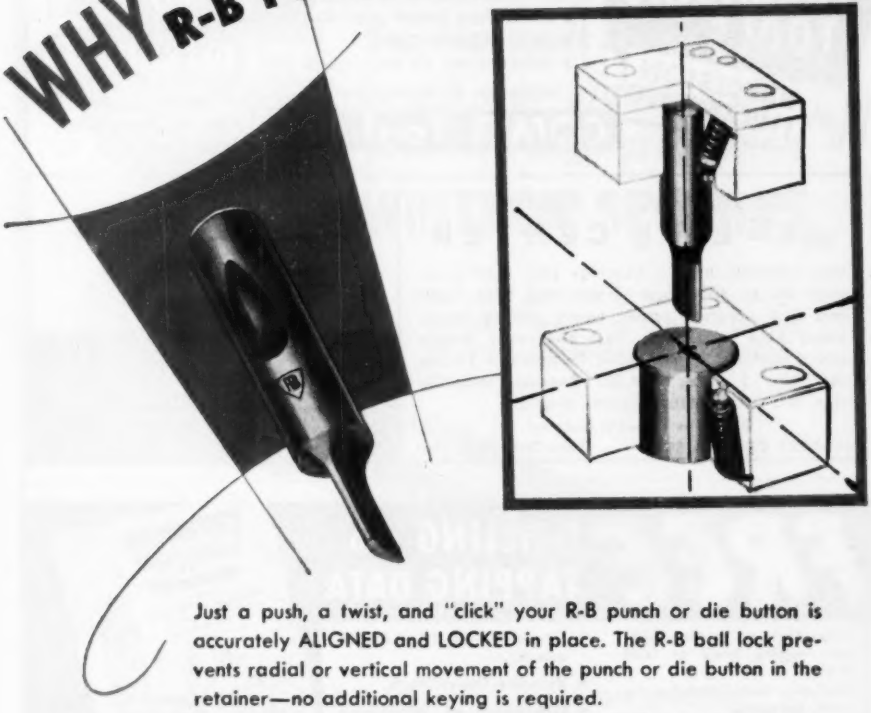
Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to ⅜" x 1½" as illustrated, other models up to ¼" x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

WHY R-B Punches are easier to use



Just a push, a twist, and "click" your R-B punch or die button is accurately ALIGNED and LOCKED in place. The R-B ball lock prevents radial or vertical movement of the punch or die button in the retainer—no additional keying is required.

R-B punches and die buttons are just as easy to remove—simply insert tanged tool in retainer hole to release ball lock. Standardized and completely interchangeable in any shape or size, these easy to use punches and die buttons save your time and energy.

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FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

MADE OF SUPER-HIGH-SPEED STEEL SPECIALLY TREATED
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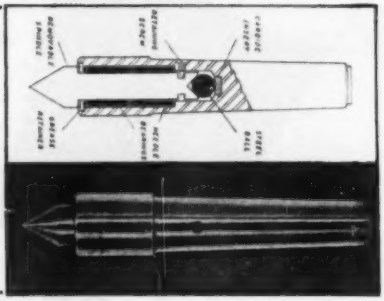
WEE LIVE CENTER

Extra capacity, needle bearings plus short overhang—30 to 40% less—makes the Wee more rigid and accurate under heavy cutting loads. Runout held to .00015. Test one—your money back if center does not prove its worth in 24-day trial. No. 3 M.T., $24.00. Request complete price list. Many sizes, tapers, shanks.

Distributor inquiries solicited

HERBERT CROSS & SON Bala-Cynwyd 2, Pa.



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647 W. VIRGINIA ST. MILWAUKEE, WISC.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

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CONFIDENCE
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Yes, thousands of machinists in all size plants prefer precision high-production

WHITNON SPINDLES

For new Surface Grinders or modernizing old machines specify Whitnon Spindles and be confident.

Whitnon Surface Grinder Spindles are precision made for faster stock removal and finer finishes . . . Ideal for the most unusual grinding applications. Whitnon Spindles are dynamically balanced as a complete assembly—skillfully lubricated to guarantee long life under most adverse conditions. Heavy spring preloading prevents all endwise motion or deflection of the rugged alloy shaft.

be confident—count on

THE WHITNON MANUFACTURING COMPANY

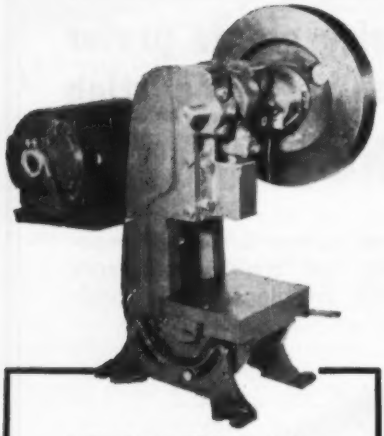
217 HIGH STREET NEW BRITAIN, CONN.

It's BRAND NEW!

the No. 00

2 TON

POWER PRESS



- Replaces Kick Presses
- Reduces Worker Fatigue
- Ideal for Stamping and Punching
- For Assembly and Other Operations
- ¾" Stroke 1" optional

The latest addition to

PRESS-RITE LINE

The New Press-Rite No. 00 is a heavy duty 2 Ton Press. Engineered for continuous hard service, ideal for stamping and punching smaller parts and secondary operations such as assembly and others. Eliminates many manual operations and reduces operator fatigue. This press will pay for itself quickly.

Write for low prices and full information today!

Sales Service Machine Tool Co. SSMT

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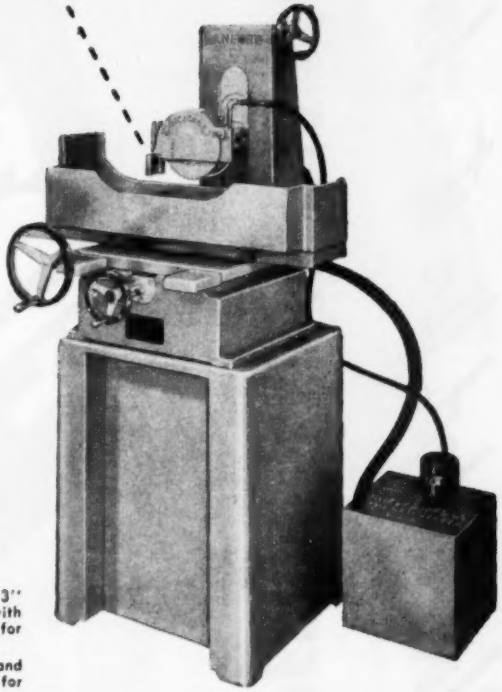
SURFACE GRINDER
MODEL MG

For Dry or Wet* Grinding!

PRECISION • SPEED • SENSITIVITY



Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining shortcuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- **Transverse ways are double Vee (VV) Meehanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.**
- **Needle, Ball and Oilite Anti-Friction bearings are used throughout.**
- **Alignments are electronically checked for accuracy.**
- **Precision slides are ground, lapped and hand spotted.**
- **Dials are large and legible.**

SPECIFICATIONS — 8¾" transverse — 13" longitudinal — 12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.

*With optional equipment

SANFORD MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.

You asked for it... here it is

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Now you can get what has been long needed ... a sintered

TESTED AND PROVED SUPERIOR

Now you can get what has been long needed . . . a sintered carbide produced specifically for steel milling cutter purposes, exhaustively tested and *proved* to be superior to any grade previously available.

The *new* FIRTHITE TXL definitely increases the volume of metal removed in mass production operations, materially reduces unit costs—through uniform performance from remarkable strength with higher wear and crater resistance.

FIRTHITE TXL is not just a new grade designation for a "hopped up" existing grade. It is a completely new combination of materials and processes painstakingly worked out in Firth Sterling research laboratories and pilot plants to do *one job better than it has ever been done before.*

How well it succeeds is shown in the results of carefully controlled field tests at right.

Write for technical bulletin and prices today.

TESTED AND PROVED SUPERIOR

Firthite TXL, through exhaustive tests in both Firth Sterling laboratories and in the field, has given superior performance. In a recent test by a prominent Midwestern milling cutter manufacturer, Firthite TXL, against ten competitive grades, proved superior in all cases and showed from 25% to 55% less wear at 5 cuts and 23% less wear at 20 cuts. Six grades were worn beyond repair before the test was completed.

The test was conducted under severe breakdown conditions on a 10" milling machine using a 6" R.H. cutter with one tooth . . . 1" square with ½ corner radius. The material used was SAE 1020 normalized forged bar steel which was climb milled at 1375 S.F.P.M. with 4⅝ inches per minute feed resulting in approximately .0053" chip load. Depth of cut was .050" and overhang of work was 3".

R-300

Firth Sterling

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It costs no more to give your Christmas Bonus in Savings Bonds. To the Payroll Saver, a One Hundred Dollar Savings Bond looks bigger and better than a check for $75. *Make this a merrier Christmas for every employee. Give the gift that keeps on giving.*

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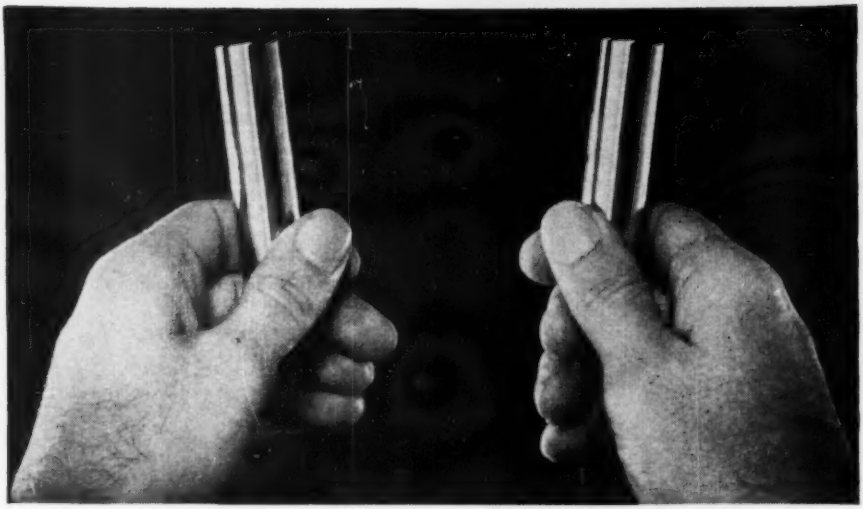
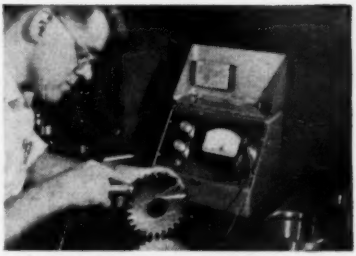
Wheaton, Illinois



SAME MATERIAL — SAME SPECIFICATIONS

Why did one of these parts cost twice as much to machine?

The answer may well show up in *your* production costs. The surface finish on the part at the left was *controlled,* using a Brush SURFINDICATOR*, to meet specifications. The surface finish on the other part was *guessed at* and the part was overfinished, exceeding specifications. Cost data shows that furnishing a 32 microinch finish, where a 125 microinch finish would be satisfactory, *doubles* the machining cost.



SURFINDICATOR* makes surface measurements easy!

You no longer have to guess at surface roughness and spend needless money in over-finishing. The Brush SURFINDICATOR permits you to measure surface roughness easily and quickly on the production line.

For booklet write Brush Electronics Company, Dept. I-12, 3405 Perkins Ave., Cleveland 14, Ohio. In Canada: A. C. Wickman, Ltd., Toronto.

* Trade-Mark

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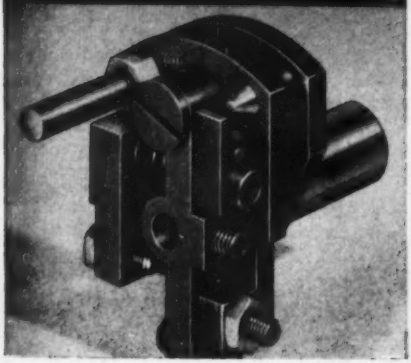
The most compact recessing tool available . . .



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Now makes possible Radial Recessing, Form Recessing or Back End Chamfering

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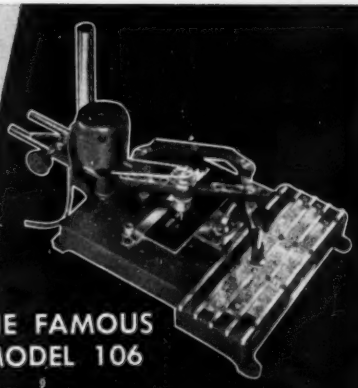


THE FAMOUS
MODEL 106

The three-dimensional bench Model 106 cuts costs — engraves, routs, models and profiles, giving you expert results even by unskilled workers.

THE NEW
HEAVY-DUTY
MODEL D-2

The Model D-2 heavy-duty, two dimensional Pantograph is a precision machine with a multitude of new features. Open on three sides, it permits complete freedom for engraving, milling, profiling large panels (up to 30" in diameter) or bulky pieces. Single, micrometer adjustment controls vertical depth of cut, automatically adjusting copy table with pantograph. Range of reduction ratios from 2-to-1 to infinity! Vertical range over 10 inches!

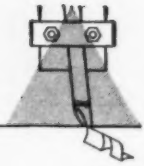
For complete information, write to

GREEN INSTRUMENT COMPANY

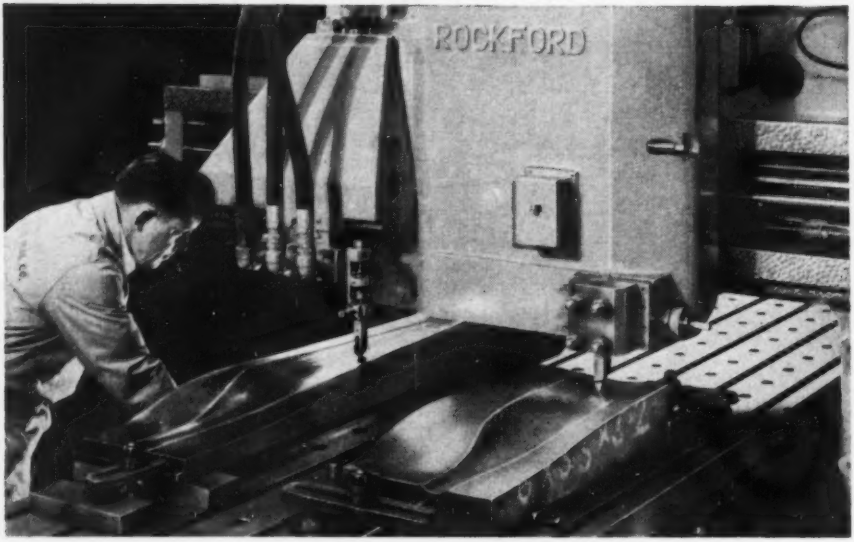
3860 PUTNAM AVENUE CAMBRIDGE · MASS.

a cost cut . . . with every stroke

of rockford kopy-kat hydraulic



duplicators



higher production is obtained with every stroke **because...**

the unique Kopy Kat duplicates automatically. It's hydraulic duplicator valve is so sensitive, so exact, that positive duplication of complex forms is done with the ease of straight-production machining.

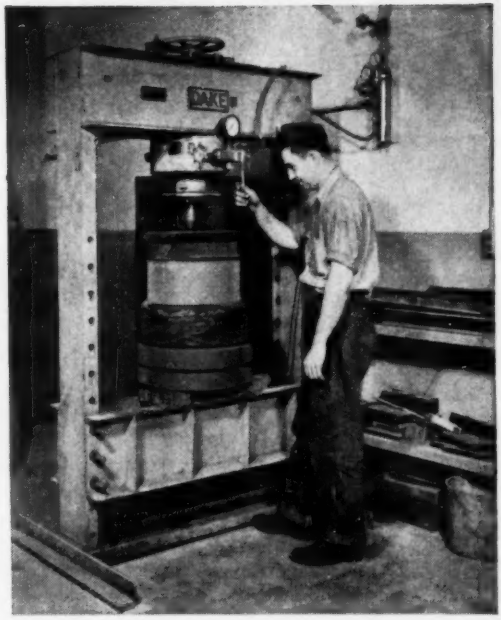
Ask us for recommendations for your duplicating shaping, planing, slotting and turning work.

OUR 52nd YEAR

ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET · ROCKFORD, ILLINOIS

With a Dake Press, lift truck tires can be changed right in your plant



No need to carry an inventory of spare lift truck wheels in different diameters and widths! With a Dake Hydraulic Press you need only tires and rims which can be pressed on and off in your own plant.

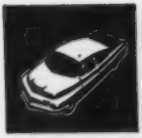
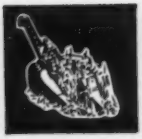
This not only means lower investment and reduced service time, but it brings additional savings from being able to buy tires direct from a mill supplier.

The Dake customer pictured above says his Dake Press pays its way on tire service alone . . . and he uses it in addition for many plant maintenance operations — such as pressing in bushings, pressing off frozen sprockets and gears, and straightening plate steel for briquetting presses.

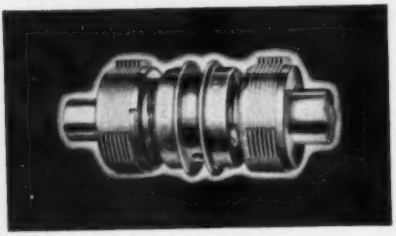
Have you stopped to think what a Dake Hydraulic Press could do for YOU? Send for illustrated Catalog 129.

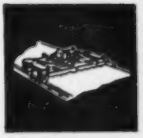
Dake Engine Company, 608 Seventh St., Grand Haven, Mich.

DAKE PRESSES

CLUTCH KNOW-HOW AT YOUR SERVICE



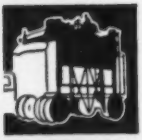


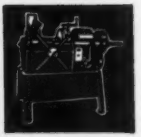
ROCKFORD CLUTCH engineers have designed clutches, power take-offs and speed reducers for hundreds of different products. This wide experience can help solve your power transmission control problems. Just send a description or print of your needs for their recommendations.

SEND FOR THIS HANDY BULLETIN

Shows unique ROCKFORD CLUTCH and POWER TAKE-OFF applications. Contains diagrams, dimensions, capacity tables, etc.

ROCKFORD CLUTCH DIVISION
Borg-Warner Corporation
1309 Eighteenth Avenue, Rockford, Illinois





ROCKFORD CLUTCHES

SUPREME is on the grow!

Industry has been asking for them. Now, after the most exacting on-the-job tests, Supreme Products, Inc. announce the addition of two new large capacity Supreme Brand Chucks to their ever-expanding line. They are:

(1) Model No. 9T3 with 3/16" to 3/4" capacity.

(2) Model No. 15T33C, 0" to 1/2" capacity drill press chuck with ball bearing lock collar.

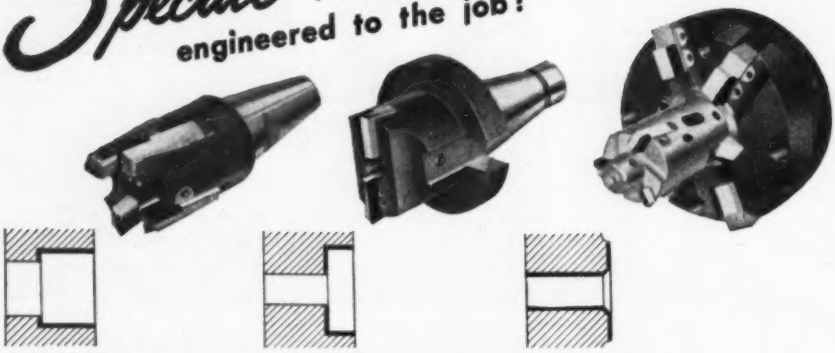
With these two new chucks, Supreme now has a total of 30 separate and distinct models for the industrial and O.E.M. user to choose from. It means that the *extra performance* of Supreme is now available to virtually the entire metal-working industry. See and try Supreme Chucks. Learn why Supreme Chucks have become standard equipment on so many of the products of America's foremost tool manufacturers.

Supreme Chucks
BRAND

SUPREME PRODUCTS, INC., 2222 So. Calumet Avenue, Chicago 16, Illinois

Special Production Tools

engineered to the job!



Combine Related Boring, Counter-Boring, Facing, and Chamfering Operations Into Just One Tool

PRODUCE BETTER WORK FASTER and at LOWER COST

● How can you keep competitive if you do four operations, when your competitor does only one?

Cut your costs and increase your output with McCrosky's "Multiple Operation" specials. Engineered specially to your individual work conditions, a McCrosky Special combines 3, 4, 5 or more related operations — does them all simultaneously with one tool — and one set-up — assuring unvarying uniformity of finished product — eliminating repeated handling — reducing the amount of work in process — speeding up deliveries and producing other economies so great that they pay their way even on moderately short runs.

Write for Bulletin No. S-18. It can really save you money!

COST CUTTING TOOLS

McCROSKY TOOL CORPORATION

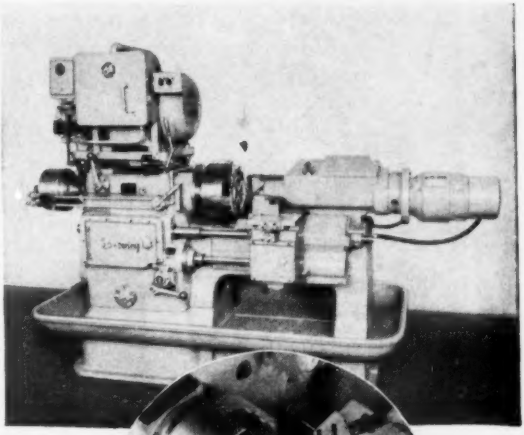
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

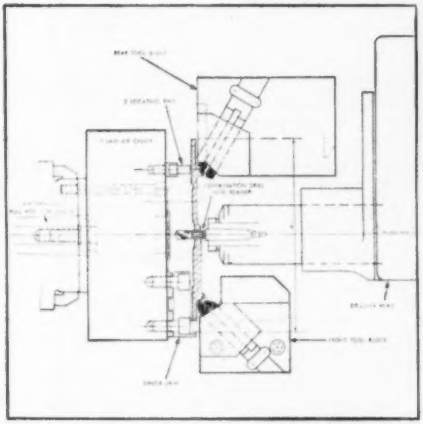
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

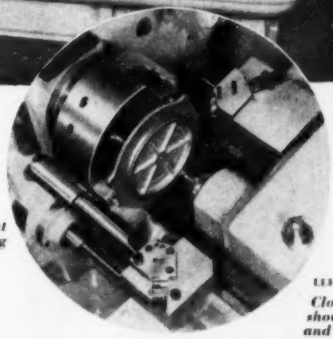
MODEL "LR" Lo-swing DRILLS AND REAMS SIMULTANEOUSLY WITH TURNING AND FACING OPERATION



RIGHT
Model "LR" Lo-swing Automatic Lathe equipped with Special Motorized Drilling Head



LEFT
Tooling layout for machining and drilling Direct Drive Clutch



LEFT
Close-up view showing tooling and work

Problem: To turn, face and groove the large diameter of a direct drive clutch, and to drill and ream center hole in a single operation.

Solution: The Model "LR" Lo-swing Automatic Lathe selected for this job was equipped with a special Drilling and Reaming Attachment which replaced the standard tailstock. This attachment is an electrically-driven, self-contained unit with its own feed cam which permits fine feed for drilling and coarse feed for reaming. Two tools on the front carriage turn two diameters. Two facing and one grooving tool are mounted on the back attachment. While all tools, including the drill, operate simultaneously, the motorized drilling head provides the correct speed for drill and reamer, while the main head-stock drive provides correct speeds for machining the large diameters.

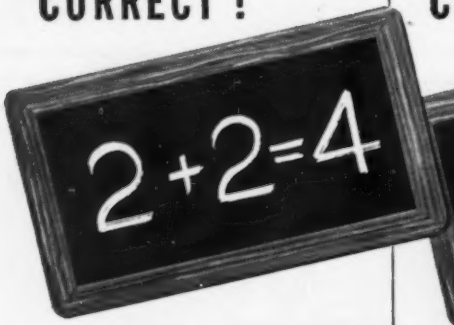
The work, which is cast iron, is held in a 3-jaw, air-operated chuck. Machining tools are cemented carbide while the combination drill and reamer is of high-speed steel.

Seneca Falls engineers are at your disposal. Let us help solve your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

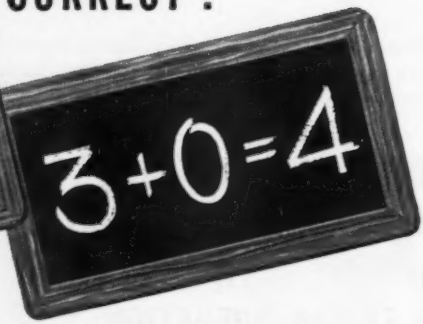
PRODUCTION COSTS ARE LOWER WITH Lo-swing

CORRECT !



in the classroom!

CORRECT !



in the tool room!

If a $2.00 tool must be replaced every six months, tool costs on that job total $4.00 a year.

If, on the other hand, a $3.00 tool will give a full year of service, you'll get $4.00 worth of tool service—and save $1.00 a year on tool costs as well.

In the very simplest terms, that's the reason why Apex tools are preferred for production nut running operations. Designed specifically for continuous, heavy-duty service, Apex tools cost a little more in the beginning, a lot less in the end.

Apex tools are precision-built of high carbon electric furnace alloy steel, cold broached and heat treated to withstand the severe shocks of impact service. That's the reason your tool costs will be lower when you ask for Apex nut running tools. Choose from more than 5,000 stock types and sizes of impact sockets, extensions, adapters, universal wrenches. If your requirements are special, send sketch or blueprint—we'll do our best to help you.

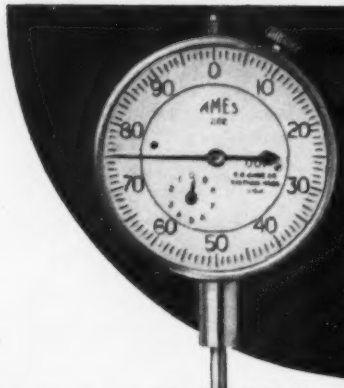
CATALOG 29—Specifications, drawings, illustrations of the complete Apex line of nut running tools. Write, on your company letterhead please, for your copy.

APEX impact sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
1028 S. Patterson Blvd., Dayton 2, Ohio

R and L
KNURLING
TOOL
HALF THE WEIGHT . . .
TWICE AS EFFICIENT AS
OTHER KNURLING TOOLS,
ONE HEX WRENCH MAKES
ALL ADJUSTMENTS!
RIGHT
R and L
LEFT
TOOLS
1825 BRISTOL STREET • PHILADELPHIA 40, PA.
TURNING TOOL • CARBIDE OR ROLLER BACKRESTS • RELEASING OR NON-RELEASING TAP AND DIE HOLDERS, (ALSO FURNISHED FOR ACORN DIES) • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL

AMES



...the preferred Dial Indicators

Over 16,000,000 cycles without wear or loss of accuracy . . . how many more will they complete?

Several Ames Model 282 Long Range Dial Indicators *with plain bearings* are currently giving an amazing demonstration of performance and endurance under test conditions. After more than 16,000,000 cycles each, at 240 strokes per minute, 9 hours a day—they still have their original accuracy!

The reasons for this outstanding record? Simply high quality materials, simple basic design, rugged construction . . . and expert craftsmanship.

If you would like to have our recommendations on your measurement problem, send blueprints and specifications. And ask for your free copy of our catalog on Ames micrometer dial indicators and gauges.

Representatives in principal cities.

B. C. AMES CO.

28 Ames Street Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

A SURVEY of importance to industrial managements

LEADERSHIP

in any sphere of industry is usually well defined—by product, service, reputation. For a recent widespread survey, an outside unbiased research organization selected *files* . . . contacted the purchasing heads of 37 types of potential file-using industries . . . and came up with these interesting facts.

"What make or brand of files do you prefer?"

"NICHOLSON" was voted first choice in 79% of the replies. Nearest to this were competitive brands "A," "B," "C" and "D" with 26%, 15%, 7% and 5% respectively. Eleven remaining brands received preferences totaling 10%. (Some 200 replies contained two or more "first" choices.)

"What is of first importance in your file-brand preference?"

"Product reputation," said 295 respondents. "Service," replied 282. Only 28 mentioned "Price."

"From what sources do you buy your files?"

"From Industrial Distributors," said 619 out of 695—about 89%. And where Nicholson or Black Diamond brand is concerned the rate would be 100%—for that is the only channel through which Nicholson sells to the widespread industrial market.

• • •

The fact that these findings bear close similarities to other independent surveys made in the past leaves no doubt where Nicholson brands stand.

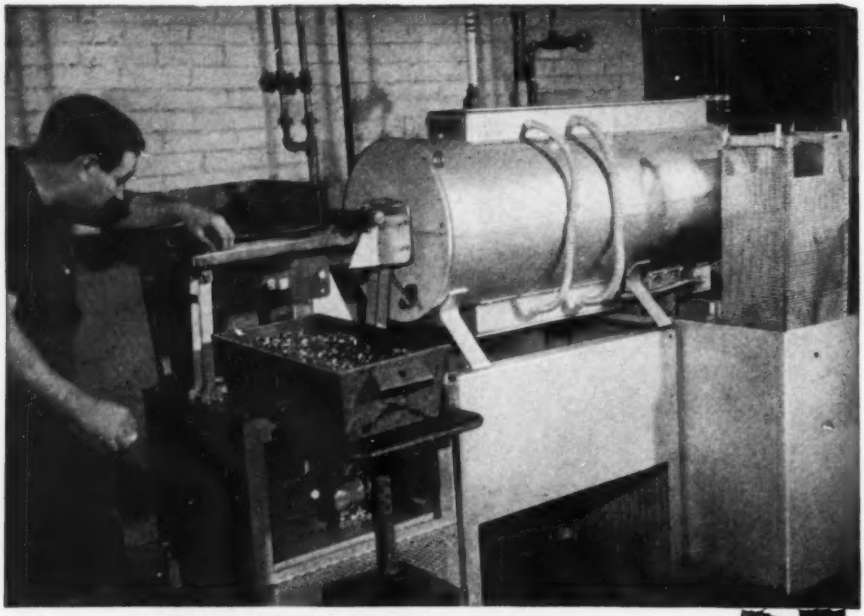
And what are the fundamentals to this emphatic Nicholson leadership? Product QUALITY, PERFORMANCE, UNIFORMITY and VALUE of the highest order. Product VARIETY that truly covers *A file for every purpose.* And, through your Industrial Distributor, the most helpful technical and supply SERVICE ever organized by any file manufacturer *anywhere.*

NICHOLSON U. S. A.

NICHOLSON FILE COMPANY, PROVIDENCE 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES *FOR EVERY PURPOSE*



RAYMOND MFG. CO.

"Bright" Hardens Precison Springs in a HEVI DUTY SHAKER HEARTH FURNACE

"We bright harden carbon, vanadium, and stainless steel springs without distortion in our Hevi Duty Shaker Hearth Furnace," says the Raymond Mfg. Co. of Corry, Pennsylvania.

Hevi Duty standard Shaker Hearth Furnaces will carburize, nitride, dry cyanide or bright harden up to 150 lbs. of small parts per hour. Operation of this production machine is semi-automatic.

Write for bulletin HD-850 today.

HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers ***Constant Current Regulators***

You Save 4-WAYS

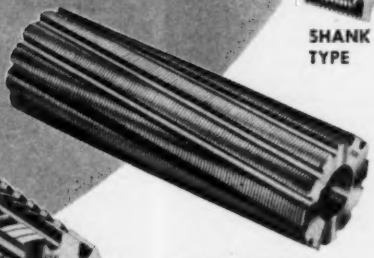
with

PRATT & WHITNEY

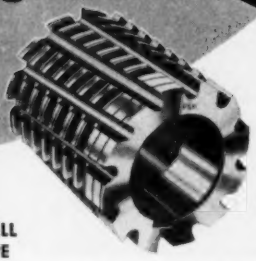
MULTIPLE THREAD

MILLING CUTTERS

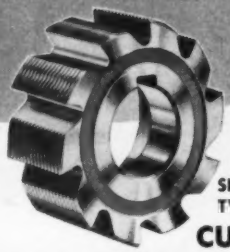
SHANK TYPE



THREAD ROLLING DIE TYPE



CURVEX TYPE



SHELL TYPE

CUT THREAD OR GROUND THREAD

1 **MORE REGRINDS PER CUTTER** . . . thanks to P&W practice of maintaining the land width at the maximum practical limit.

2 **MORE PIECES PER GRIND** . . . because they're made only of carefully selected high speed steel and correctly heat treated.

3 **ASSURED ACCURACY** . . . that eliminates rejects. Each cutter is made accurately to the required specifications and carefully inspected; in addition, a test piece is cut and the thread form inspected with a high-magnification optical comparator.

4 **FAST, FREE CUTTING** . . . that saves production time . . . thanks to correct P&W design with proper rake and relief for the metal being cut.

For prompt effective service, give one of our factory-direct Sales Engineers the opportunity to analyze your thread milling and other cutting tool needs. Just write or phone the P&W Branch Office nearest you.

First Choice SINCE 1860 *for Accuracy*

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DIVISION NILES-BEMENT-POND COMPANY

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FACTORY-TRAINED ENGINEERS IN PRINCIPAL CITIES

MACHINE TOOLS • CUTTING TOOLS • GAGES

520 CUTS

IN AN 8-HOUR DAY...
Angles, Bars, Channels and Beams

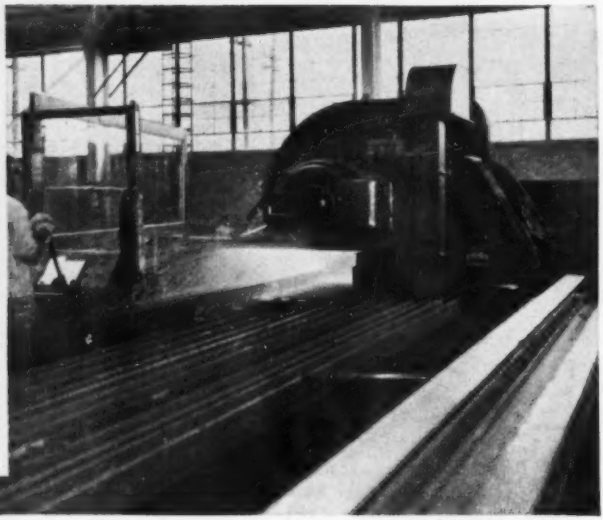
Report from
Joseph T. Ryerson & Son, Inc., Chicago; branch warehouses in principal cities.

Number of Kling Friction Saws in use
16 — among all Ryerson plants.

Jobs performed
Cutting angles, bars, channels, beams.

Average Cuts Per Day
Average 520 cuts of miscellaneous items in an 8-hour day, ranging from light channel sections to 30" x 124 lb. beams.

Other Advantages
Has reduced the amount of burr, reducing time required to chip or clean the cut.



Kling HIGH SPEED FRICTION SAWS

increase cutting production **FOR "THE BEST OF COMPANIES!"***

Greater cutting speed with all types of steel . . . versatile ability to cut many different kinds of structural shapes... cleaner cutting . . . and lower investment in initial equipment—these are some of the advantages that attract industrial plants and steel warehouses like Joseph T. Ryerson & Son, Inc.—to the use of Kling Friction Saws.

One Kling High Speed Friction Saw can handle a volume of cutting that would otherwise require several shears or other type saws. Consequently, Kling Friction Saws make possible faster cutting of structural shapes without changing set-up, than any other known process.

The reason for the exceptional speed of Kling Friction Saws is, that they operate on a principle practically the opposite of the ordinary tool or conventional saw. Friction sawing concentrates the heat on the material to be severed, at a rate which is faster than it can absorb heat. The process is not new, but has been applied successfully for years.

* *Some of the companies using Kling Friction Saws:*
Allis-Chalmers Mfg. Company A. M. Castle & Company Bethlehem Steel Inc.
Douglas Aircraft Co., Inc. Kyle & Company L. B. Foster Company
Lone Star Steel Company Madsen Iron Works Inc.
Jos. T. Ryerson & Son, Inc. Stephens-Adamson Mfg. Company
The H. M. Harper Company U. S. Steel Corporation

Complete Friction Sawing Information FREE! Write for Bulletins that tell you in detail, exactly how Friction Saws work and what they can do in your shop to save you time and money.

KLING BROS. ENGINEERING WORKS • 1320 North Kostner Avenue, Chicago 51, Illinois

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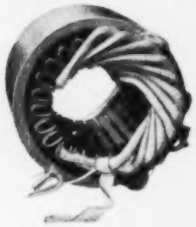
WORKMANSHIP
PERFORMANCE

To Motorize is to Modernize . . .

To Modernize is to Economize.



EXTRA YEARS OF SERVICE!

Each individual coil of the winding is insulated and separated by a double layer of insulated tape.

Slipping belts and defective motors may be costing you more than you think! At surprisingly small expense, highly efficient ball bearing Wood's Motor Arbors or Shaftless Motors can be installed to provide real economy and top performance.

Precision-Built and "full tape insulated", these exceptional motors are available in a wide variety of types and range from one to one hundred horse power—or will be built to your own specifications.

Write today for descriptive material or ask our Engineering Department for the solution of any special motor problem.

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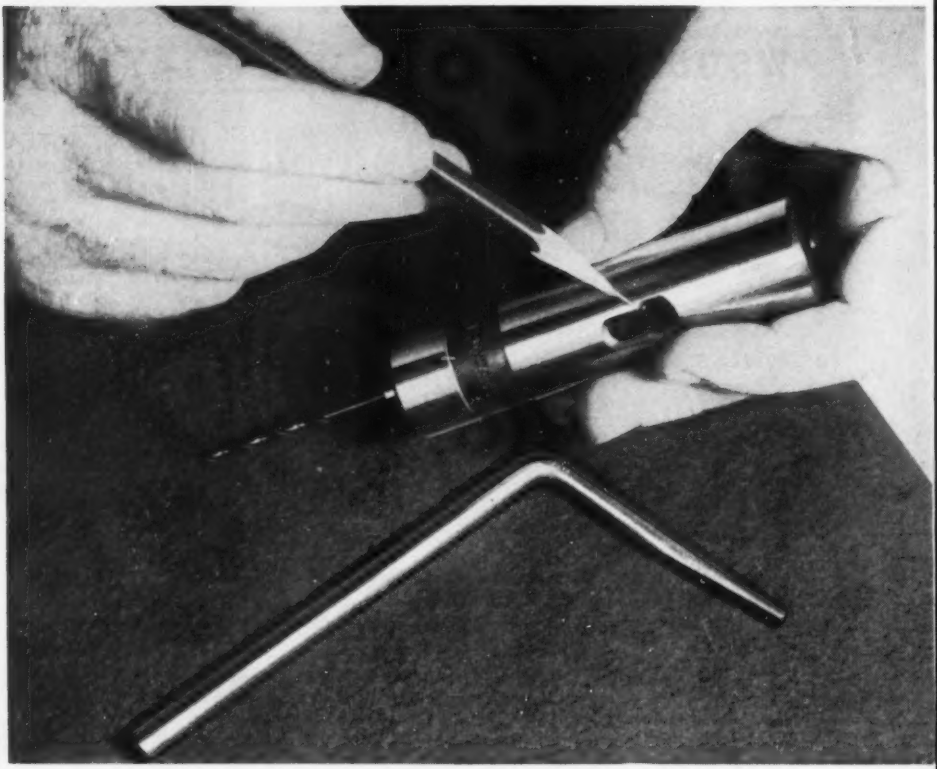
Export Dept.: United States Machinery Co., 90 Broad Street, New York City

New Scully-Jones

simplifies and speeds tool changes



Prevents damage to bearings and spindles often caused by hammering!

SCULLY JONES

Here's another reason why it pays to standardize on Scully-Jones "Precision Holding" Tools. This new tool ejection method (now *standard* on Scully-Jones Tools shown on right-hand page) offers many advantages over conventional methods of "drifting" tools from a holder or spindle.

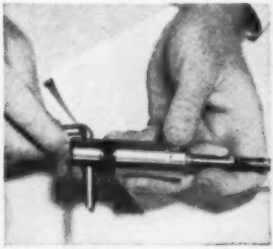
Damage to machine bearings and spindles may now be eliminated because Scully-Jones "Keyhole" Tool Ejectors literally "push" tools and adapters out of the spindle *without pounding*. There are no axial stresses or shocking blows to break tools and knock spindles out of alignment.

Ejection is faster and easier, too. It frees one hand to hold the tool being ejected. Stationary mounted in presetting gage plates, "Keyhole" Tool Ejectors are ideal for making tool changes with a minimum of time and effort. So, look for these new "Keyhole" slots in the next Scully-Jones tools you buy. Write for details in Bulletin No. 14-50.

"Keyhole" Tool Ejector

. . . safeguards machine accuracy!

Cam-shaped tip of the "Keyhole" Ejector fits in rounded top portion of "Keyhole" drift slot. Operator merely turns the handle slightly—the cam on the ejector creates a smooth, powerful "push" directly behind the tool.



Ejector is quickly and easily inserted and removed from the "Keyhole" slot. Ejection is foolproof as the slot accommodates conventional drift pins should a tool or adapter become "jammed" in a holder or machine spindle.

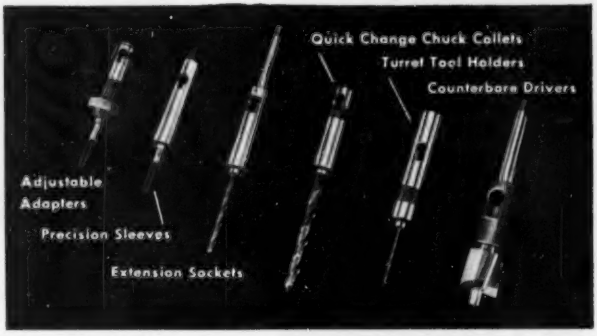
"Keyhole" slots are the new "standard" on these Scully-Jones "Precision Holding" Tools!

Quick-Lock Adjustable Adapters—With the exclusive Scully-Jones "Keyhole" drift slot, pilot nose, and Quick-Lock nut, you can change tools and make accurate depth adjustments faster and easier. Write for Bulletin 6-50.

Precision Sleeves and Sockets—Select from a complete line of hardened and ground precision sleeves to reduce any ASA or Morse taper hole to smaller taper. Short, medium, and long series extension sockets. Style 100 "Use-Em-Up" sleeves also available. Bulletin 7-50.

Quick Change Chucks and Collets—Give you multiple-spindle range on single-spindle and gang-type drilling, reaming, and tapping operations. Tool and collet are quickly and easily locked in the chuck without stopping the machine spindle. Have variety of applications. Write for Bulletin No. 3-50.

Counterbore Drivers—Complete range of drivers for



Turret Tool Holders—They're hardened and ground to assure perfect fit in the turret and withstand rough usage without nicking and burring. Easy to insert and align throughout a lifetime of service. Short, sleeve, and extension types available to meet most needs. Write for Bulletin 7-50.

Scully-Jones Solid High-Speed Steel and Carbide-Tipped Counterbore Cutters, Countersinks, and Core Drills. Write for Bulletin 5-50.

Stocked by Scully-Jones Distributors in all principal cities

SCULLY-JONES

"Precision Holding" for holding precision

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Precision-made of both Carbon Vanadium and high carbon, high chrome steels.

Exclusive distributor wanted for the state of California.

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GLENCO Floating Tool Holders

No fine adjustments necessary. These holders correct misalignment to 1/32" radius AS THEY TURN. They've been saving set-up and tool change time on screw machines, drill presses and lathes for over 20 years. Are you using them fully in all departments? Might pay to check!

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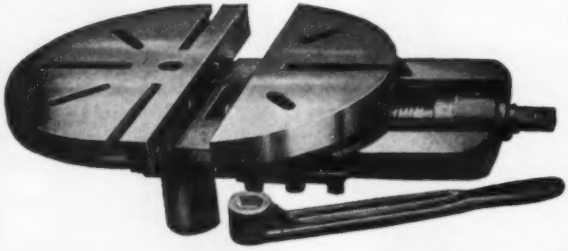

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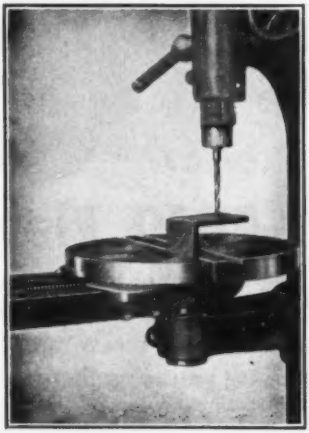
Combines a drill table, a vise, a set of parallels and V blocks. No more lost fingers, from hand held jobs that slip. No more 30 minute set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

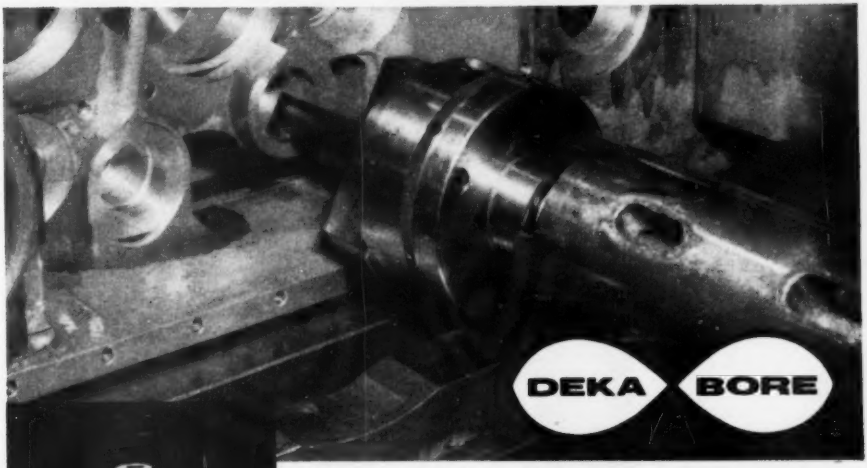


WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

MODERN MACHINE TOOL CO.
Jackson, Michigan

save 80% of boring time



Typical application of Model A-4 Deka-Bore, used for boring to .0003 tolerances on a horizontal boring mill at the Sterling Engine Co., Buffalo, N. Y. Fast, positive .0001 adjustments on the exclusive Deka-Dial make this extremely tough job relatively simple.

ONLY DEKA-BORE

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— can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

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A full 5" x 10" capacity, low cost, handy saw for use in both small and large plants. Get details. Write today.

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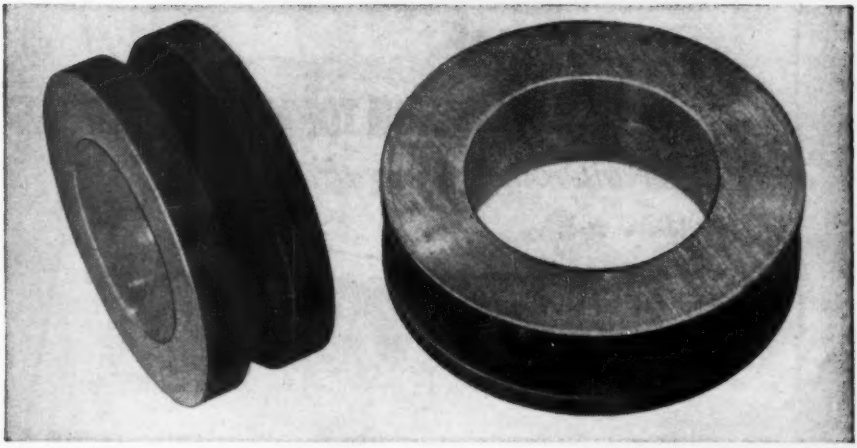

How Flame-Plating keeps **DOWN-TIME** Down

Deep grooves worn in straightening rollers by small diameter wires often badly score larger wires which are passed through the same set-up. The result—costly machine down-time periods are necessary to change rollers. One manufacturer solved this problem by using rollers Flame-Plated with wear-resistant tungsten carbide. Now, machine down-time costs are at a minimum and a better product is produced.

Flame-Plating is a new LINDE process for applying wear-resistant coatings of tungsten carbide to the wear surfaces of parts and many tools made of most common metals. For the full story on how you can solve your wear problems with Flame-Plating, send for new "Flame-Plating" booklet.

LINDE AIR PRODUCTS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
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In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde Trade-Mark

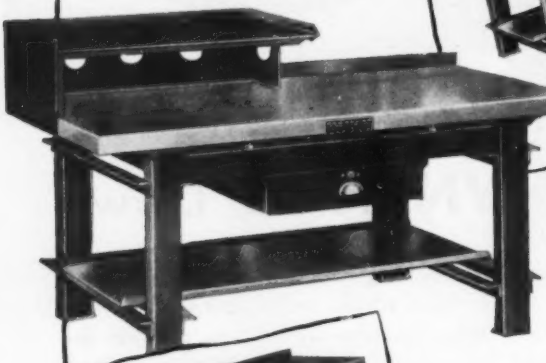
It's CHALLENGE CAST-IRON TOP WORK BENCHES

for all-round shop efficiency!

3 Styles - 4 Sizes

All with durable 2-inch warp-proof, shrink-proof, fire-proof cast-iron top. All have leveling screws. All built to a high standard of Quality.

Challenge Work Bench with tool box shelf.



Challenge Work Bench with Cast-Iron Top, Tool Box Shelf and a Steel Drawer with Pilfer-Proof Lock.

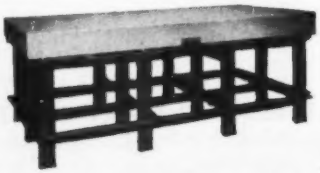
Challenge Work Bench without shelf or drawer.

TOP SIZES

4 Legs	6 Legs
28x48x2	28x72x2
28x60x2	28x84x2

Semi-Steel

LAYOUT SURFACE PLATE for layout, inspection or assembly lines. Available either precision ground or planer finished. Sizes from 12x18" to 54x144".



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Challenge

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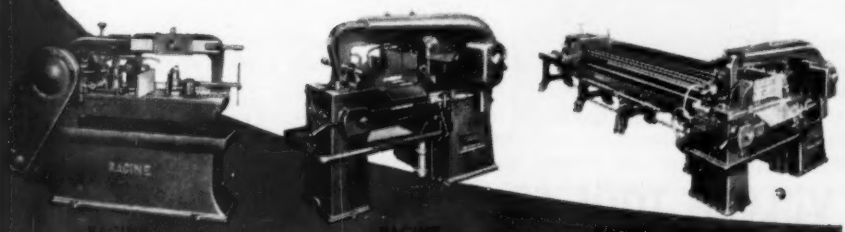
Obsolete metal-cutting equipment day by day increases your production costs. New, modern RACINE Metal-Cutting Machines save material, reduce cut-off time, and because of their extreme accuracy, lessen costly subsequent machining operations. Available are single-purpose or fully automatic bar-feed units in all capacities — 6" x 6" to 20" x 20".

Write us about your metal-cutting needs and catalog of our complete metal-cutting saw line. Address: **RACINE HYDRAULICS & MACHINERY, INC.**, 2070 Albert St., Racine, Wisc.

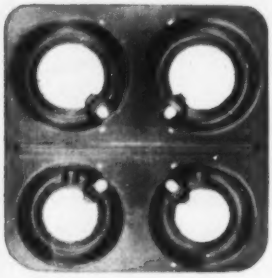


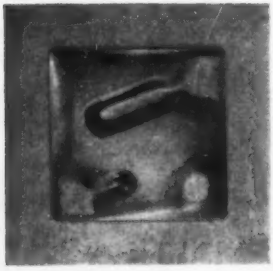
RACINE

Plastic Low Cost Tooling

For

Dies · · · Drill, Welding, and Assembly Jigs





Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

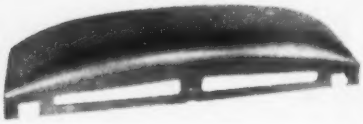
Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

VULCAN TOOL CO.... PLASTIC TOOL DIVISION

Highland Avenue, Dayton 10, Ohio



Major Vulcan Services

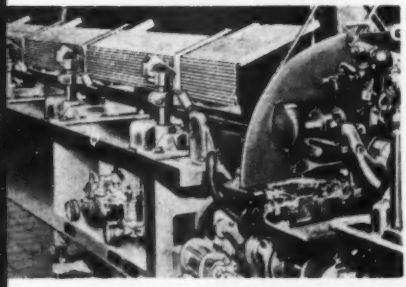
Engineering, Processing, Designing and Building Special Tools . . . Dies . . . Special Machines . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size, Vulcanaire Jig Grinders, Plastic Tooling.

Through the 4th Dimension Time Barrier to New Production Highs

LIPE AML BAR FEED

gears machine production to the steady flow of Time

All industrial results are achieved in Time . . . *vital 4th dimension that measures output, costs, profit.* Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . *and you are getting 4th Dimension production.* Production that is geared to the steady flow of Time.



Lipe AML Bar Feed Produces from 30% to 100% More Output by Eliminating Time Losses . . . . .

Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

Mail the coupon now for free literature giving full details on the Lipe AML Bar Feed.

LIPE ROLLWAY

LIPE-ROLLWAY CORPORATION
Syracuse 4, N. Y.

Sure, I'd like to know more about the Lipe AML Bar Feed. Send me your free booklet.

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Now you can buy
a press brake like this "off the shelf" for $1455

Verson now offers standard brakes with immediate delivery from stock

Any shop where metal is bent can now take advantage of a new convenient way of buying quality all steel press brakes. There's no need for involved proposals or a long wait for delivery. You can now buy Verson No. 16-48 and No. 1062 brakes as easily as buying a car. Prices are published publicly and delivery of standard models is made from *stock*.

Write for spec sheets on either model and then place your order.

A Verson Press for every job from 60 tons up.

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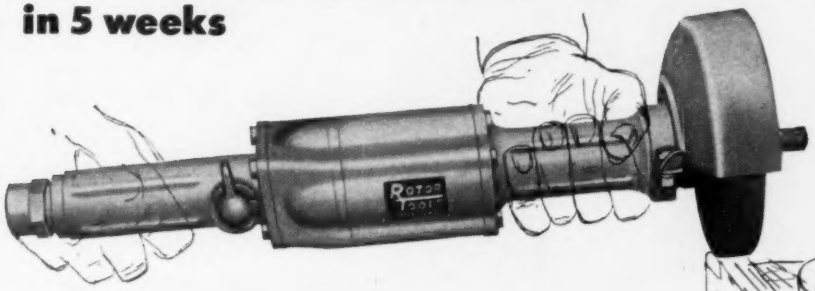
DOUBLES OUTPUT

New Rotor D-6 Air Grinder pays for itself in 5 weeks



JOB: Removing flash and parting lines from steel castings. Tool used 50% of production time.

FORMERLY: Used 6" electric grinders at 3700 rpm. Required 10 minutes per casting.

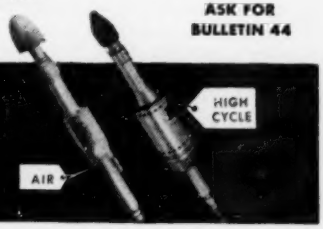
NOW: Using New Rotor D-6 Air Grinders at 6000 rpm. Job time cut to 5 minutes.

RESULTS: Output doubled. Savings paid for new Rotor Grinder in 5 weeks. Wheels last longer. Tool is 5 lbs. lighter, easier to handle.

A demonstration on *your* work will show how *you* can improve production with these new Rotor Grinders. Ask for proof.

ASK FOR BULLETIN 44

THE ROTOR TOOL CO.
CLEVELAND OHIO



sub ZERO treatment

. . . Eliminates Distortion

. . . Cuts Grinding Cost

. . . Increases Production

. . . Boosts Tool Life

at
WATERBURY TOOL DIV.
VICKERS, INC.
WATERBURY, CONN.

Used in conjunction with a conventional carburizing-heat treatment cycle, Sub-Zero treatment at this noted manufacturing plant showed three-fold advantages. Formerly, in the production of precision parts, distortion showed up after finish grinding, necessitating several grinding operations. Now, Sub-Zero has eliminated the cause of distortion . . . a single grinding operation is all that is required and production has increased.

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A new catalog gives complete technical data on Sub-Zero metal treatment . . . shows how you, too, can save. Write for your copy today!

CINCINNATI SUB-ZERO PRODUCTS

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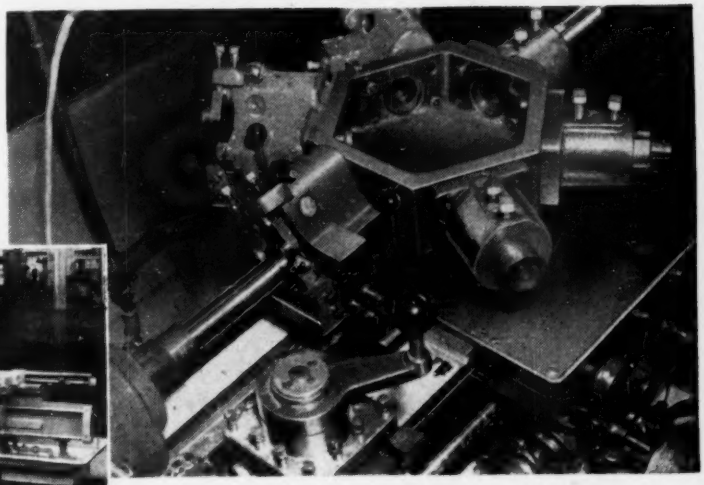
Cincinnati 29, Ohio

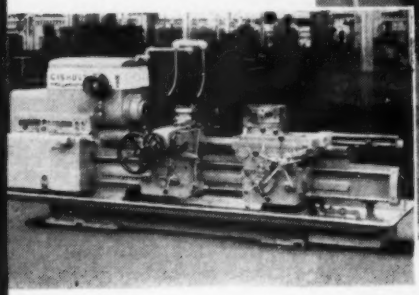
take shaft jobs Like This:

they take less time on

GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

GISHOLT

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES · AUTOMATIC LATHES
SUPERFINISHERS · BALANCERS
SPECIAL MACHINES

GISHOLT MACHINE COMPANY

MADISON 10, WISCONSIN

LOWER THE BOOM ON COSTS

SET RIVETS FAST

2 at a time with the

Chicago **"214"**

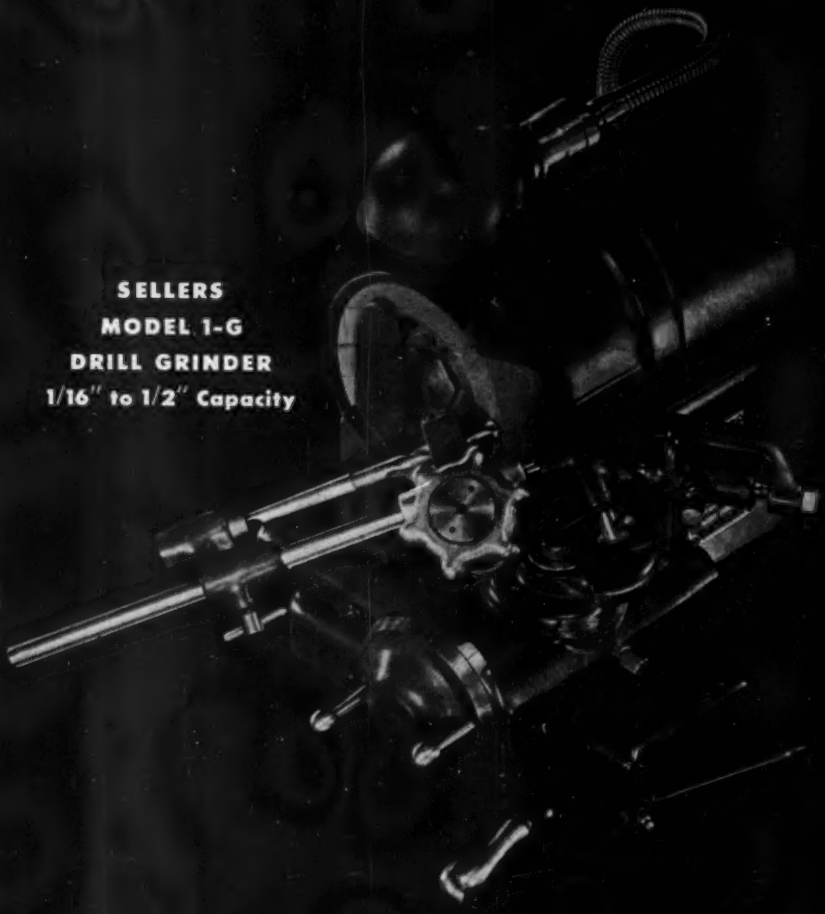
With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" diameter or smaller steel tubular rivets—lengths to 7/8". Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to versatility. For help with fastening problem...send sample assembly (or a blue print) for free fastening analysis.

***FREE CATALOG** contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.*

Chicago Rivet **& MACHINE CO.**

9610 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

***Branch Factory:* Tyrone, Pa.**



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MODEL 1-G
DRILL GRINDER
1/16" to 1/2" Capacity

Nothing will do so much to reduce your drilling cost for so small an investment as a Sellers Drill Grinder!

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MULTI-PURPOSE WONDER GRIP VISES

Tested for Performance to High American Standards

Immediate Delivery from New York Stock

MADE IN GERMANY

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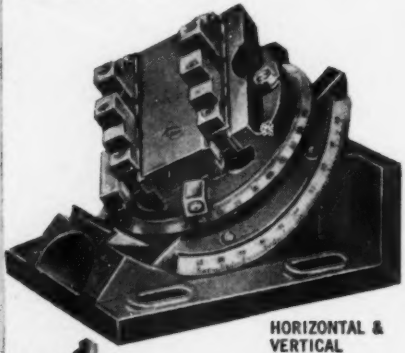
HORIZONTAL SWIVEL TYPE

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.



HORIZONTAL & VERTICAL SWIVEL TYPE

- Tapping Attachments
- Quick Change Chucks & Collets
- Wille-Grip Keyless Drill Chucks
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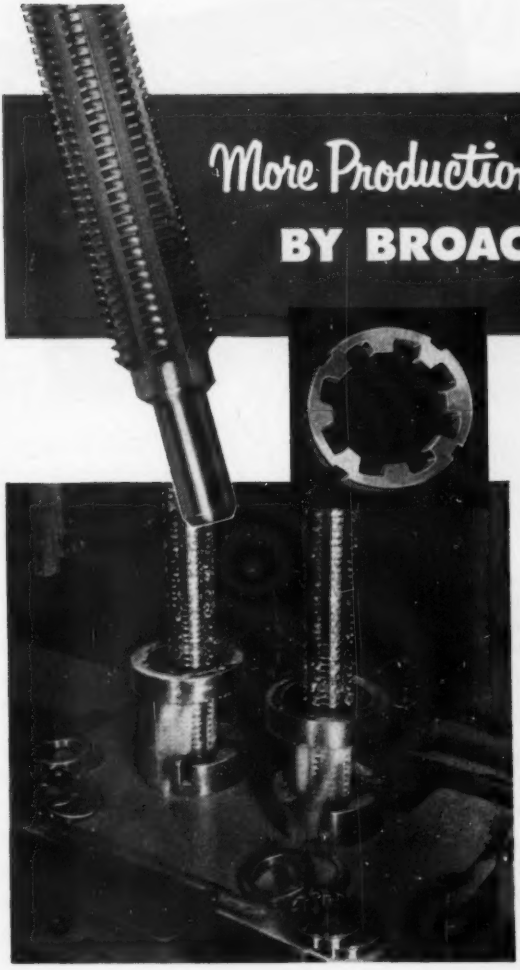
More Production, More Profit BY BROACHING . . .



Internal broaching of a cam ring. Note the complexity of the ring design. The steel is soft and tends to tear, yet this Continental Broach sizes the I.D. and cuts 8 splines 5/16" deep *in one pass.*

REMOVE STOCK TO PRECISION LIMITS—FAST . . . ROUGH AND FINISH IN ONE PASS!

The scope of Broaching has broadened in recent years. Many broaching operations do precision work in far less time than other metal-cutting methods.

Continental Engineers have for years been designing all types of cutting tools and broaches. They can recommend without bias your most economical way to do the work.

For facts about increasing your production by broaching, call in your local Ex-Cell-O representative—or write Continental in Detroit for Cutting Tool Catalog.

CTW

Continental TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION DETROIT 32, MICH.

84-59

NORMA-HOFFMANN BALL BEARINGS

Rugged—thoroughly dependable for carrying thrust and radial loads.

NORMA-HOFFMANN ROLLER BEARINGS

Short, cylindrical roller design . . . heavy-duty bronze retainer . . . lowest possible co-efficient of friction under heavy load.

Norma-Hoffmann heavy-duty Bearings improve the design and performance of products wherever they are used. They are dependable, give friction-free smoothness and quietness of operation. Available in a wide range of sizes for every load, speed and duty. Write for catalog and engineering assistance.

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Precision **BEARINGS**
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT—Founded in 1911
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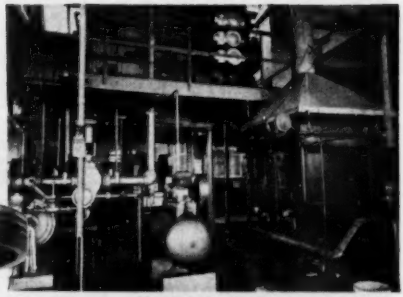
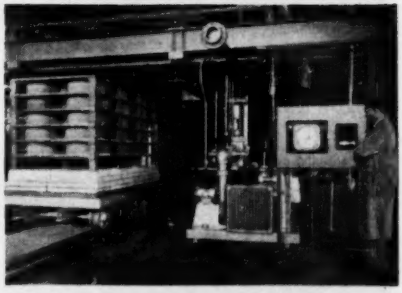
From the NEW Blanchard Wheel Shop





VITRIFIED WHEELS

For more than 25 years, Blanchard has directed its efforts toward developing the best grinding wheels for Blanchard Surface Grinders. It began by pioneering with silicate bonded wheels, and then resin bonded wheels. Now, from a new, ultra modern Blanchard wheel shop come *vitrified wheels* ... scientifically batched, pressed and fired ... with positive control of time and temperature.

Today, Blanchard offers complete wheel service ... silicate, resin and vitrified!

Use Blanchard wheels on your Blanchard Surface Grinder. They do a better job in less time, with less trouble and cost ... whether your work is tough as copper or fragile as glass ... whether it requires heavy roughing cuts or clean-up cuts with flatness to .000005" and finish of 1 micro-inch.

for Better Blanchard Grinding

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE CO.

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

COUPON

Please send free copy of Blanchard Wheel Booklet and Wheel Holder Folder. BB

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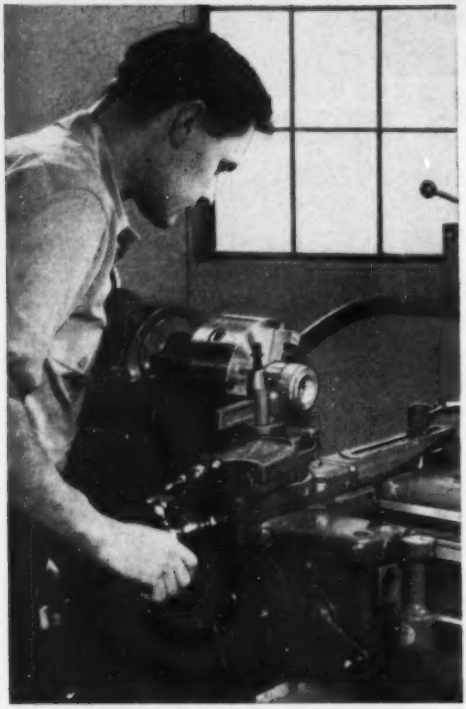
COMPANY_____

STREET_____

CITY_____ STATE_____

SOUTH BEND 13" LATHES



for accurate, low-cost machining

South Bend 13" Lathes are popular wherever precision parts are machined. Costs drop as their efficiency keeps production flowing even on the "headache" jobs. Operators prefer them for their simplicity and effortless handling. Set-ups and change-overs are made quickly and easily so that down-time is held to a minimum.

Find out how these quality-built lathes can bring you better machining at lower costs. Your South Bend distributor will be glad to show you how they can help your machining problems. Or, mail coupon for catalog. Base price $1460—Time payment terms 10% down.

SPECIFICATIONS

Swing — 13⅜".
Distance between centers — 28¼", 40¼", 52¼".
Collet capacity — 1" max.
Spindle bore — 1⅛".
Spindle speeds — (8) 40 to 940 r.p.m., approx.
Longitudinal, cross and thread cutting feeds — 48 each.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ TOOL GRINDERS ☐ ½" & 1" Collet TURRET LATHES ☐ 7" BENCH SHAPERS

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Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

A Mechanical Eye to Watch Your Tools

Reduce Tool Costs!

Cross Tool Control Unit Automatically Stops Machine When Tools Need Changing

The Cross Tool Control Unit reduces tool costs, decreases machine downtime. Available in four different sizes, it can be used with most types of metalworking equipment.

Here's what it does:

- ★ **Provides continuous picture of used and unused tool life and establishes performance standards.**
- ★ **Decreases downtime by permitting tool changing in groups.**
- ★ **Reduces scrap by stopping machine before tools lose size.**
- ★ **Reduces tool grinding costs.**

Write for complete details today.

Established 1898

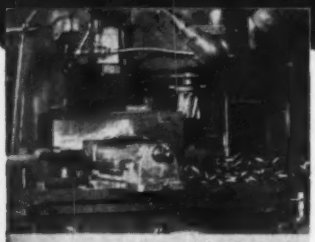
THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

A new twist in milling cutter design...

removes metal 3 to 10 times faster!
gives finishes of 20 rms and better!



Proof of "Helicarb" efficiency!
A 3" "Helicarb" straight shank end mill on a 50 h.p. mill removed 61½ cubic inches of 2340 nickel alloy steel (Rockwell C28) per minute! Spindle speed 416 r.p.m.; table speed 19" per minute; cut depth 1-5/32".

The new Sonnet Helicarb Milling Cutters combine the edge hardness of one-piece carbide tips with the proven principle of a true helix flute design. Result? A rugged, heavy duty cutter unmatched for stock removal and efficiency!

The constant included cutting angle of the "Helicarb" cutter distributes the cutting load uniformly over the full length of the cutting edge. Under proper conditions, this unique shearing cutting action reduces impact and gives 3 to 10 times greater production than possible with helical flute high speed steel, or straight tooth, carbide-tipped cutters. Uniform chip load and proper chip flow result in longer cutter and carbide life, less chatter, minimum chip recutting and smoother finishes—*20 rms and better on actual production jobs!*

Ask your authorized industrial distributor for prices and sizes.

Slab Mills

Shell-End Mills

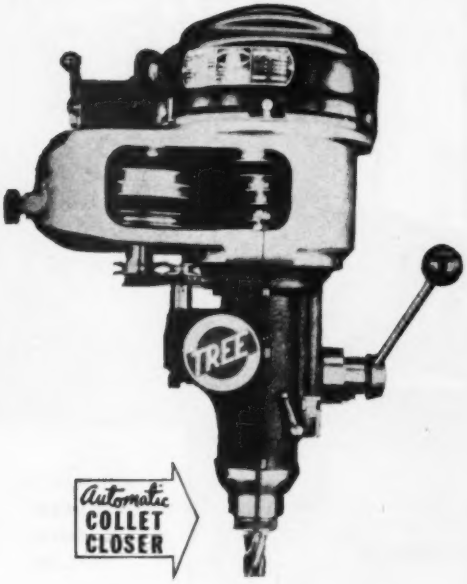
End Mills

HELICARB

HELICAL CARBIDE MILLING CUTTERS

Sonnet Tool and Mfg. Co., 576 No. Prairie Avenue, Hawthorne, California

do you need . . .
VERTICAL MILLING CAPACITY?



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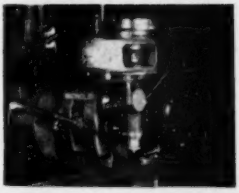

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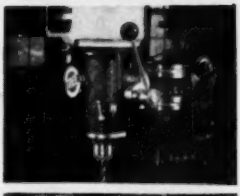

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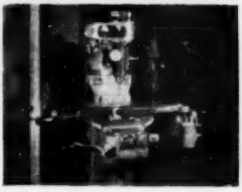

You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

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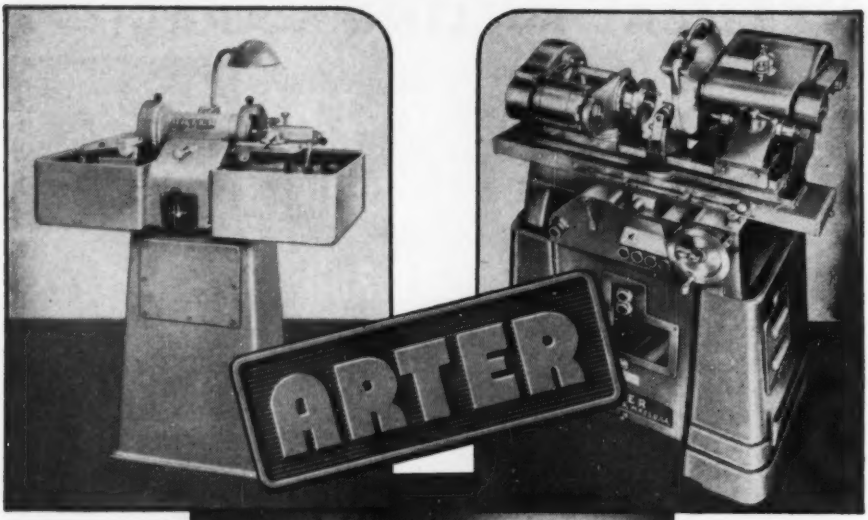
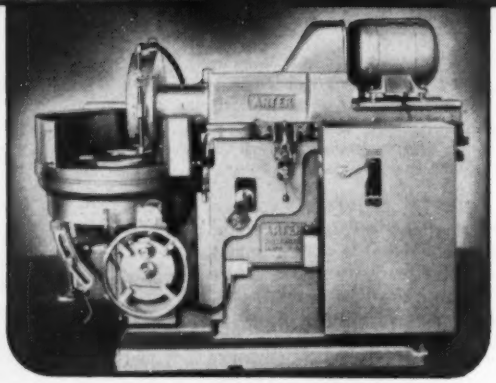
The Arter Family of Machines



CARBIDE
TOOL
GRINDERS



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ROTARY SURFACE GRINDERS

Chuck Capacity 8" to 40"

The Arter trademark on these machines is the sign of
ACCURACY • POWER • DEPENDABILITY.
Tell our engineers your grinding problems.
They'll find a way to lick them.

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WORCESTER • MASSACHUSETTS

Agents in industrial centers of United States and Canada

Save labor...

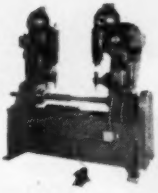
cut costs with

FASTER *Riveting and Clinching!*

T-J

RIVITORS

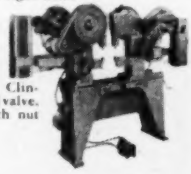
T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.



DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two ½" dia. x ⅞" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.

CLINCHORS

T-J CLINCHOR . . . one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets 11/16" square cased nuts in outside quarter panels, left and right hand.



DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set ⅝" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.

Automatic
Feeding and Setting

T-J meets your needs for labor-saving SPEED in assembly . . . with performance-proved Rivitors and Clinchors for many jobs today...in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets . . . with high production! Electrically powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅜" diam. and up to ¾" long. Throat depths 8" to 36".

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

37 YEARS EXPERIENCE T-J

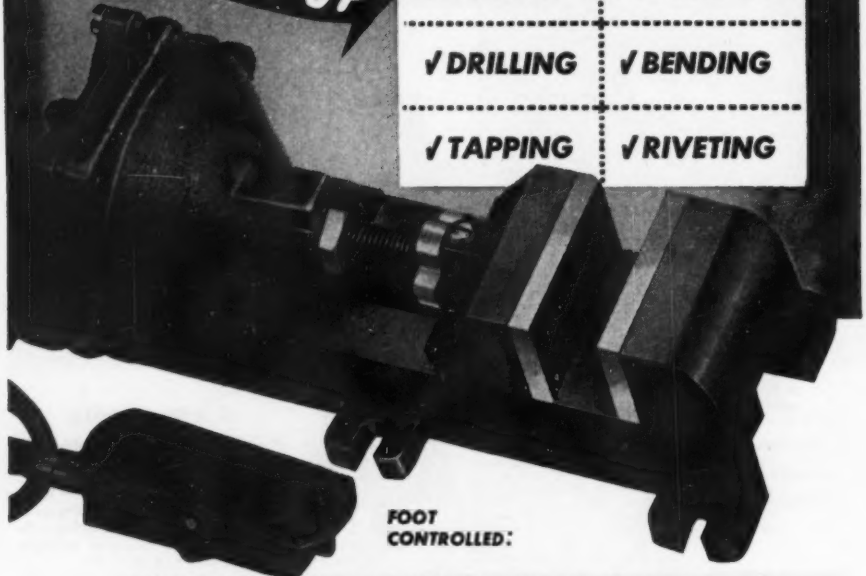
TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

SPEEDY AIR VISE

SPEEDS UP

✓ MILLING ✓ PUNCHING
✓ DRILLING ✓ BENDING
✓ TAPPING ✓ RIVETING



GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.
Complete with Foot Control Valve, Air Hose and Fittings . . only **$36.00**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

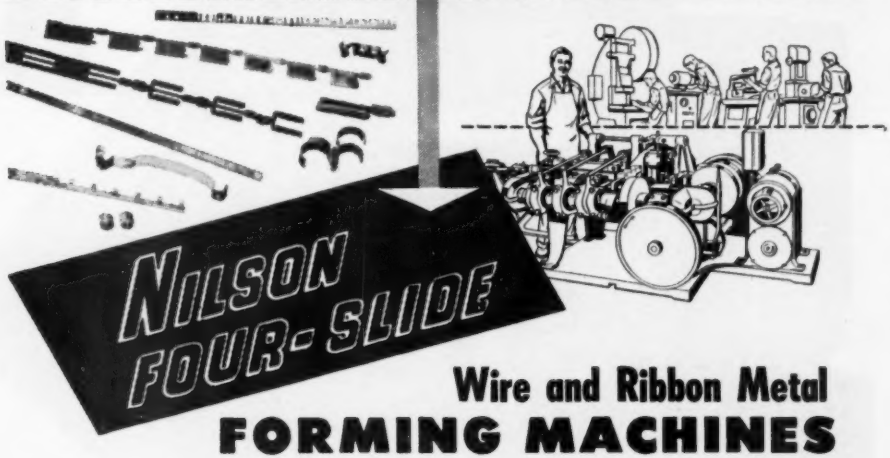
AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $5.95. Less gauge, $3.25

AIR FILTER
Keeps water and particles out of the regulator and pneumatic tools. $3.00

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . $3.00

W. R. BROWN CORP. · 2651 NORMANDY AVE. · CHICAGO 35, ILL.

Save Metal | *Save Labor*



Wire and Ribbon Metal
FORMING MACHINES

Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation.

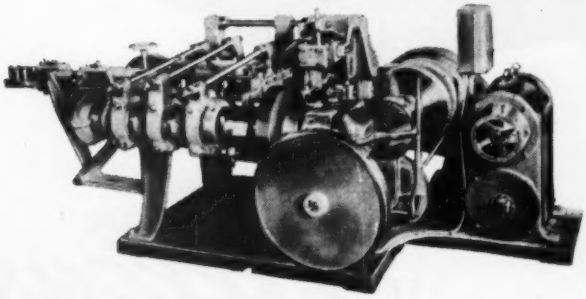
Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . ***automatically*** in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for ***all*** operations! One operator!

For specific recommendations... send details of your operation.

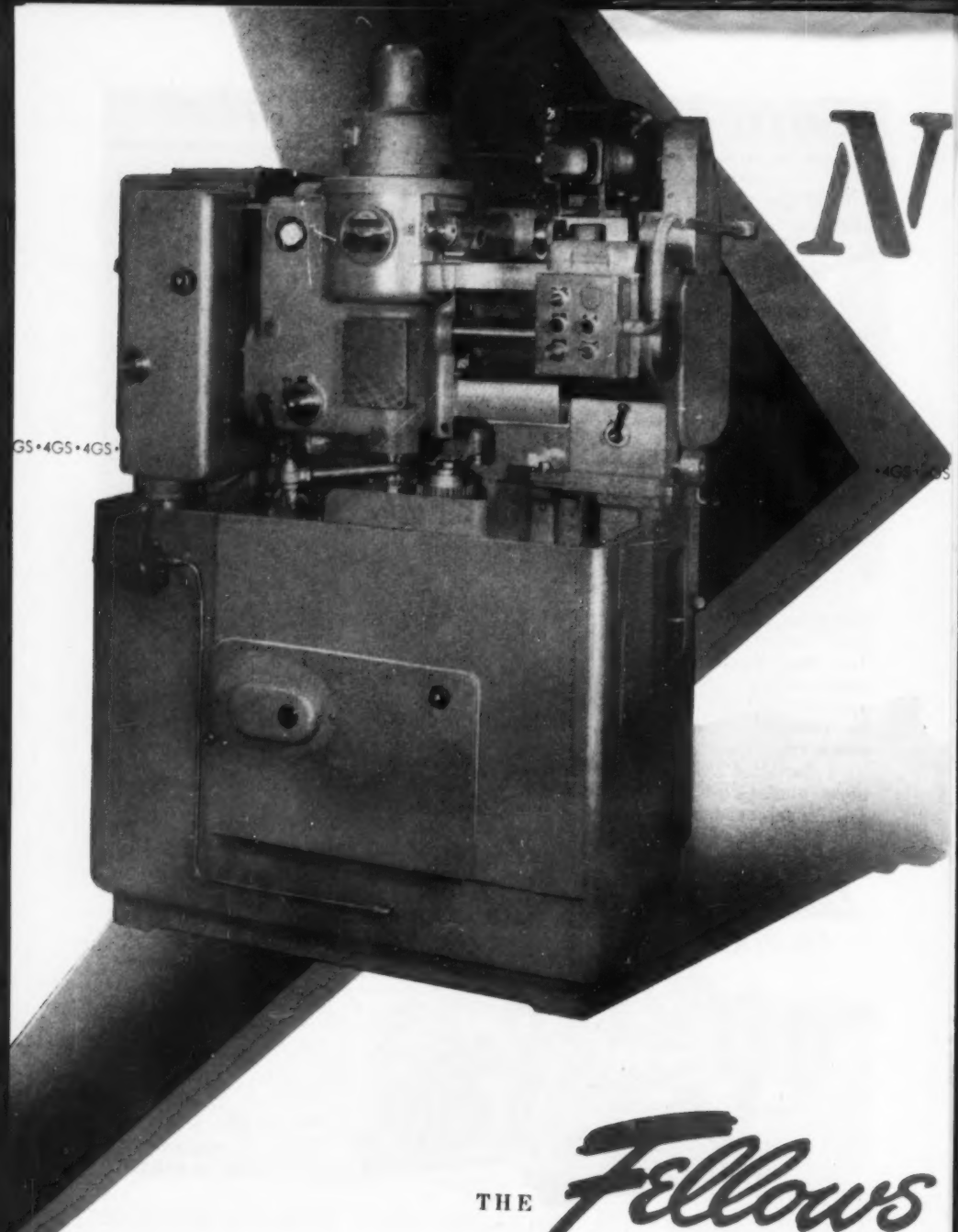
THERE'S NOTHING LIKE A **NILSON**

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY
1511 Railroad Avenue
Bridgeport 5, Connecticut



CHICAGO
CLEVELAND
DETROIT
LOS ANGELES
HAMILTON, ONT., CANADA



THE *Fellows*

E W S

FOR GEAR PRODUCTION MEN

4GS • 4GS • 4GS

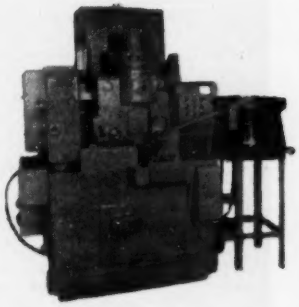
- This, the all-new No. 4GS Gear Shaper, will (1) remove more stock, (2) hold to limits more easily, and (3) turn out finish-cut or preshave gears faster than anything you've known.

- It's a production man's Gear Shaper—with a drive-mechanism beefed up to match its 3⅜ inch diameter cutter spindle which takes 4 inch cutters. Speeds from 98 to 635 strokes per minute are available through pick-off gears.

- Range of rotary feeds from 0.008" to 0.024" per stroke based on a 4 inch pitch diameter cutter.

- Its maximum capacity of 6 inches p.d. x 2 inch face puts it in line for the greatest percentage of mass output gear cutting ... Ask any Fellows office for advance engineering information.

4GS • 4GS • 4GS • 4GS • 4GS • 4GS • 4GS • 4GS



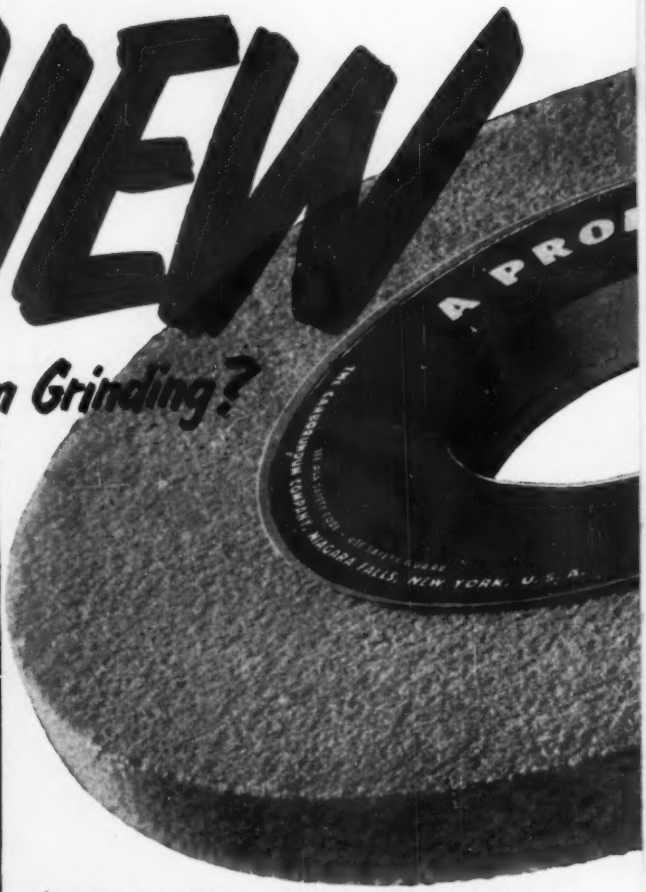
Ideally adapted to automatic loading as illustrated here

GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.

Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1 • 5 Martel Bldg., 6214 West Manchester Ave., Los Angeles 45, Calif

WHAT'S NEW in Tool Room Grinding?



SUPERIOR PERFORMANCE

COMPLETE STOCKS—Immediate delivery from your CARBORUNDUM Distributor!

Call him, or your CARBORUNDUM Salesman (listed in the yellow pages under "Abrasives" or "Grinding Wheels") for full details on these outstanding V40 Bond Wheels and a demonstration in your own shop, on your own tools. Or write to the Carborundum Company, Dept. BB 81-414, Niagara Falls, N. Y.

...continually putting more sense in your abra

A complete line of wheels for **EVERY** tool room grinding operation

...IN EVERY WAY

- **Cool and Free Cutting,** on high speed steels, even on hi-vanadium types.
- **Greater Form-holding Ability,** for longer wheel life, less edge breakdown, less dressing.
- **Easier Dressing,** because of special V40 bond composition, gives substantial savings in diamonds, time and abrasive.

EASY TO ORDER

You can usually order V40 Bond wheels in the same grit and grade as you are now using. (Specify AA Type abrasive in V40 Bond). But—that's where the similarity ends. For V40 Bond Wheels will outlast, outperform any other tool room wheel in your shop.

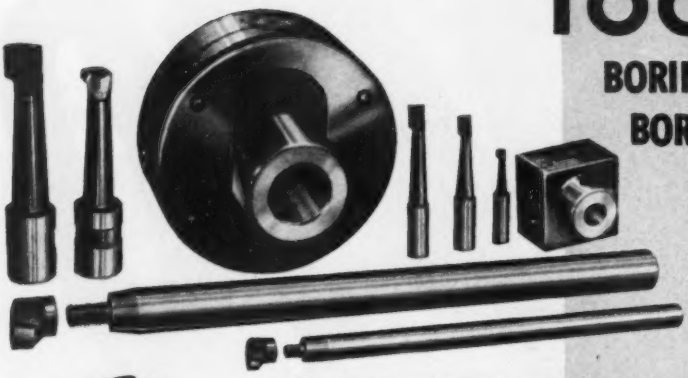
CARBORUNDUM

REGISTERED TRADE MARK

for more *Accurate* cuts...
greater *Rigidity* in

BORING TOOLS

BORING HEADS
BORING BARS



Use CRITERION
BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ⅜ to 1¾ inches diameter. Bore holes from ⅛ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

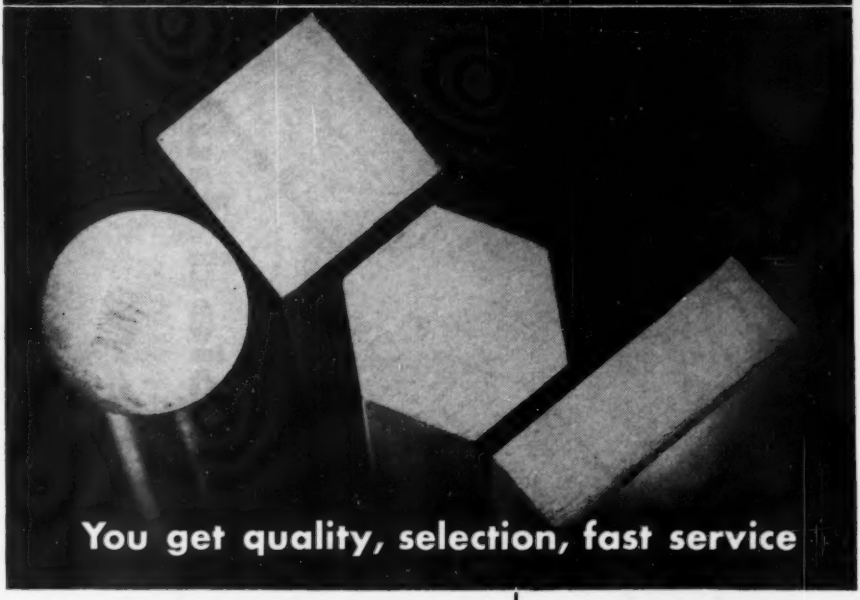
LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.
See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

CRITERION
MACHINE WORKS

9312 SANTA MONICA BLVD • BEVERLY HILLS, CALIF.

WHY IT PAYS TO BUY COLD FINISHED BARS FROM US



You will save money buying your cold finished bars from U.S. Steel Supply. We carry complete stocks of all the shapes and sizes that are in common demand. All are manufactured from the world's leading quality steel—United States Steel. And we will work closely with you to select exactly the right quality for your requirements—and the right quality is *not* always the most expensive.

You needn't tie up money and space in large inventories of cold finished bars . . . we can quickly supply whatever you need. Call us for: cold finished rounds, squares, hexagons, flats and precision shafting in all grades; cold finished screw stock, Bessemer rounds, "MX" high speed screw stock.

TRIPLE SECURITY

What you want
When you want it
At the right price

U. S. STEEL SUPPLY

DIVISION

General Offices: **208 So. La Salle St., Chicago 4, Ill.**
Warehouses and Sales Offices Coast to Coast

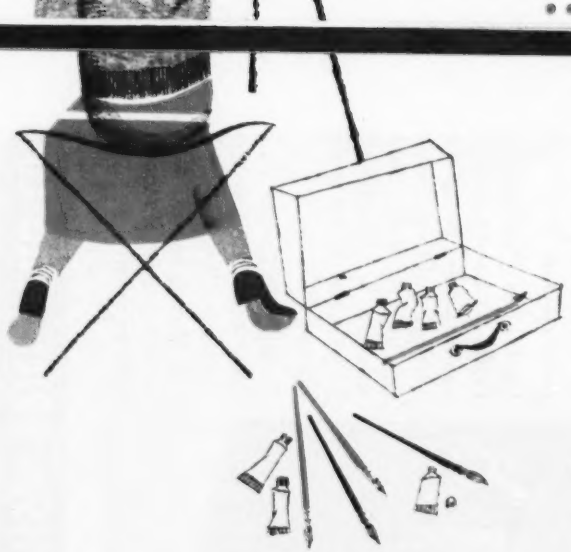
UNITED STATES STEEL

copied but not duplicated

...and ***REX*** *is the original*

high speed steel by which

...and REX is the original



high speed steel by which all others are judged

Great works of art clearly show the unique skills of their maker. Even the most careful copy can never truly duplicate the original.

Crucible REX® High Speed Steels are *originals*, too. Ever since 1900, when the Country's leading tool steel specialists combined their knowledge and formed Crucible, we have lavished on tool steel making all the skill and care that goes into any work of art.

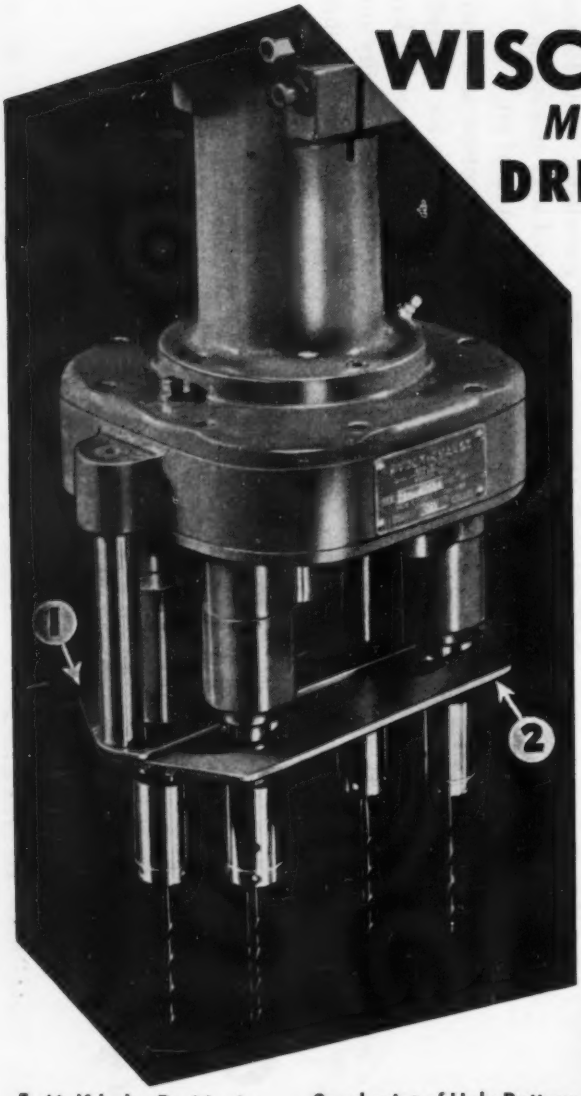
That's why REX is the standard of comparison wherever high speed steels are used. But see for yourself. Put REX to work in your shop . . . check its hardenability, response to heat treatment, general quality and fine tool performance. We feel sure that, like thousands of others, you'll come back for more.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

WISCONSIN
Multiple
DRILL HEADS



Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

2. Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

WISCONSIN DRILL HEAD CO.

BUTLER, WISCONSIN

A 5942-1P

Think Twice!
EGGS
Angular planes of Sheffer's Self-Cleaning collet repel sludge like fan blades
Users report year-long runs without down-time for cleaning.
30%
Patent applied for.
STANDARD COLLETS
"BB" ONE-PIECE INSERT PUSHER
"ECONOMY" PUSHER
SCREW MACHINE ACCESSORIES
SHEFFER COLLET CO.
TRAVERSE CITY, MICH.

YOU'RE IN FOR A SHOCK!

You're in for a shock if you think that WILTON costs more, just because it's the world's finest machinists' vise. WILTON **costs no more than ordinary vises,** even though it has more gripping force, greater strength, straight-line pull, sealed-in design, permanent lubrication, and an unconditional 5 year guarantee!

ATTACH THIS AD TO YOUR LETTERHEAD FOR A FREE DEMONSTRATION OR LITERATURE!

"The Finest Name In Vises"

WILTON TOOL MFG. CO., INC.

925 WRIGHTWOOD AVE. • CHICAGO 14, ILLINOIS

WILTON TOOL CANADA LTD. GUELPH, ONTARIO, CANADA

Here's that extra small size set you have needed!

20 out of 38 blocks between .05005" — .059"

Don't allow missing gage blocks to slow up inspection. When key blocks are being used elsewhere a second set comes in mighty handy.

The 38 block set is predominantly a set designed for small dimensions but serves adequately in supplementing larger sets.

In addition to costing less than a full size set it also has a wider range in small dimensions.

Twenty of the 38 blocks are in range between .05005" to .059". Every set includes wear blocks. Write for prices and description.

ACCESSORIES THAT MULTIPLY THE USEFULNESS OF STANDARD GAGE BLOCKS

When blocks are combined with accessories they serve as snap gage, height gage, ring gage, plug gage, calipers and scribers.

Webber GAGE BLOCKS

WEBBER GAGE COMPANY
12905 Triskett Road • Cleveland 11, Ohio

Largest exclusive manufacturer of precision gage blocks

EFFECTIVE- EFFICIENT* aye, and ECONOMICAL, too!

PARALLOC Dial Snap Gages

With a remarkable new type of pin locking mechanism that minimizes "out-of-parallelism" between anvil faces. "L" Type fully encased, with set-back indicator and handle, permitting entry into narrow recesses. Wide choice of indicators as for "D" Type.

PATENTED

"L" (LEVER) TYPE

8 SIZES, each with ½" range, cover over-all range 0" to 4"

"D" (DIRECT) TYPE

8 SIZES, each with 1" range, cover over-all range 0" to 8"

DIAL Bore Gages

10 SIZES

cover range from

1/8" to 24"

PATENT APPLIED FOR

Three new models extend dial bore gaging range by intermediate steps down to ⅛" diameter. Each utilizes STANDARD's new, highly practical CENTERING-SIZE DISC principle. Simple in design, easy to set, easy to use; amazingly accurate and effective in small bore gaging.

DuBo Plug Gages

PATENTED

SINGLE END
Sizes over 1.510"

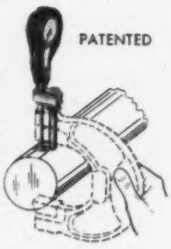
DOUBLE END
Sizes under 1.510"

Whether handle will drop freely or not shows "Go" or "NoGo". Finger-tip operation reveals internal bore conditions by sensitive "feel". Tells more, more easily, than ordinary plug gages.

Dializers®

STANDARD's original device for converting AGD Adjustable Limit Snap Gages to DIAL Snap Gages. Wide range of indicators from 1⅛" to 2¼" diameter, graduations of .001", .0001", .0005" and .00025", and a wide variety of dial markings, including metric.

Available separately for your frames or assembled in AGD frames supplied by us.



PATENTED

DIAL INDICATORS

A complete range of sizes and mountings, with any desired graduation; regular, metric or Decimatic . . . all completely shockproof.

*** EFFICIENCY**
- EASE OF HANDLING
- EASE OF READING
- LONG SERVICE LIFE
- REDUCTION OF FALSE REJECTS

Write for "NEWS"; get full details of new STANDARD instruments that speed production and save you time, money and worry.

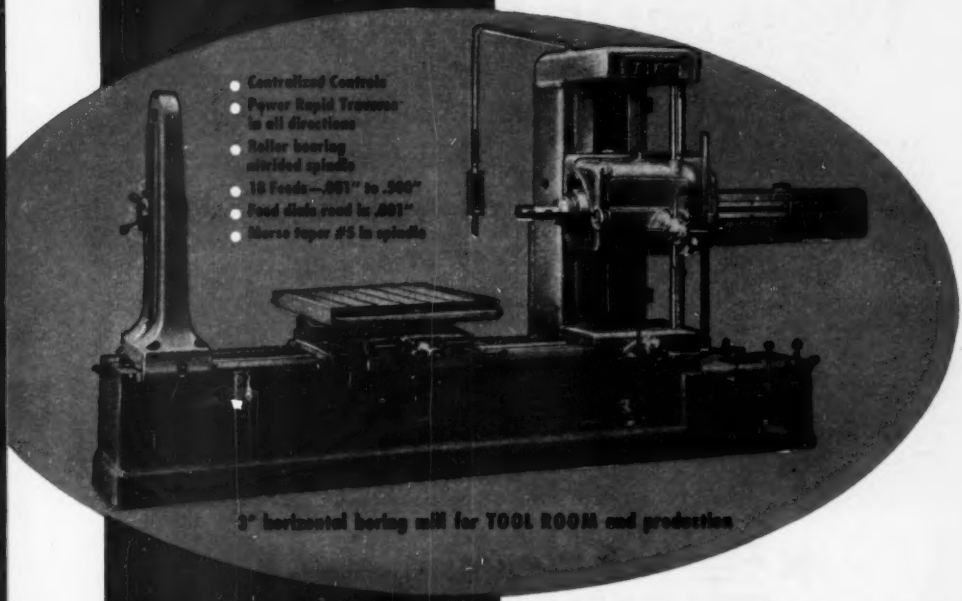
STANDARD Gage Co., Inc.
Poughkeepsie, N.Y.

immediate delivery

3" horizontal boring mill for TOOL ROOM and production

table top swivels full 360°

18 speeds—17 to 910 r.p.m.


Centralized Controls
Power Rapid Traverse in all directions
Roller bearing shielded spindle
18 Feeds—.001" to .500"
Feed dials read in .001"
Morse Taper #5 in spindle

3" horizontal boring mill for TOOL ROOM and production

WOTAN

over 75 years of "know-how" in the manufacture of precision production machinery

Users of the WOTAN Boring Mill find that advanced engineering and expert craftsmanship have combined to produce an outstanding piece of tool room equipment that is also well suited to long and short production runs.

Simplicity of design permits an unusually low price. Parker Machine Company has these Mills on hand for immediate delivery. Write or phone John Schleiffer at our Brooklyn headquarters for full information.

Parker Machine Company, Inc.

158 PIONEER ST., BROOKLYN 31, NEW YORK · TRIANGLE 5-2103 and 2157

TOOL & CUTTER GRINDERS

ENGINE LATHES

HORIZ. & VERT. MILLERS

VERTICAL TURRET LATHES

16" AND 22" SHAPERS

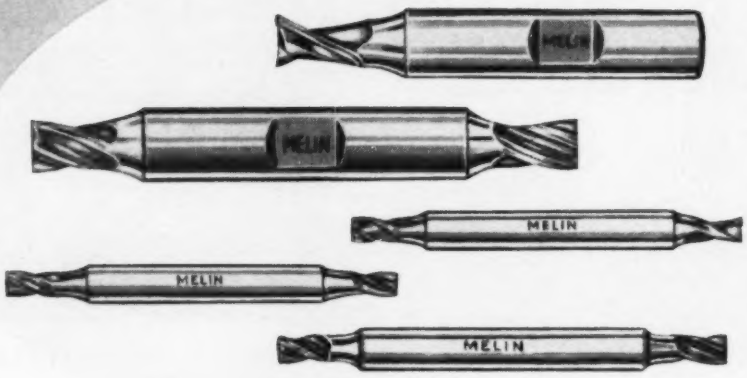
MELIN

STUB LENGTH END MILLS

with flutes shorter than regular

Offer GREATER STRENGTH...★

TWO, THREE AND FOUR FLUTE



...★ ***Plus an Exclusive*** ... **In addition to manufacturing a *complete* line of End Mills, the Melin Tool Company makes several standard *Stub Length Mills* exclusive of other tool manufacturers.**

The new Melin Tool Catalog No. 54-C lists the specifications on these *all inclusive* Stub Length Tools . . . and . . . they offer greater strength and less breakage. Write for your catalog . . . today.

Representatives in Principal Cities

MELIN TOOL COMPANY, INC.

3374 West 140th Street
Cleveland 11, Ohio

Speedier Set-ups and Output of Medium-sized Screw Machine Work . . .

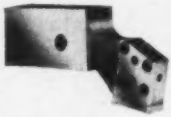
The No. 4 Automatic, like all Brown & Sharpe Automatic Screw Machines, incorporates the most advanced features for high-speed, repetitive production to extremely close tolerances. In addition, it has many outstanding set-up advantages: turret tools, for example, are readily accessible and the method of mounting them provides firm support for heavy cuts. Moreover, a separate motor permits tools to be "jogged" into position — or a complete cycle of operation can be run through by hand. Investigate *all* the advantages of the No. 4. You'll agree it's the production leader in its class — an important contribution to metal-working. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

Brown & Sharpe B·S

GREENLEE *Automatics*

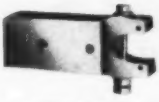
Circular Form-Tool Holder

Dovetail Form-Tool Holder

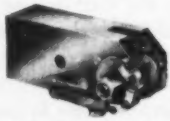


Bit-Type Form-Tool Holder

Cut-Off Tool Holder

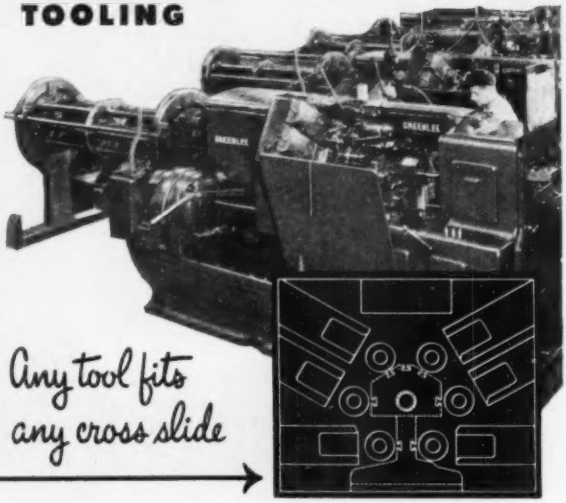


Knurling Tool Holder



Stencilling Wheel Holder

INTERCHANGEABLE TOOLING



Any tool fits any cross slide

SAVE TIME AND MONEY REDUCE JOB COSTS

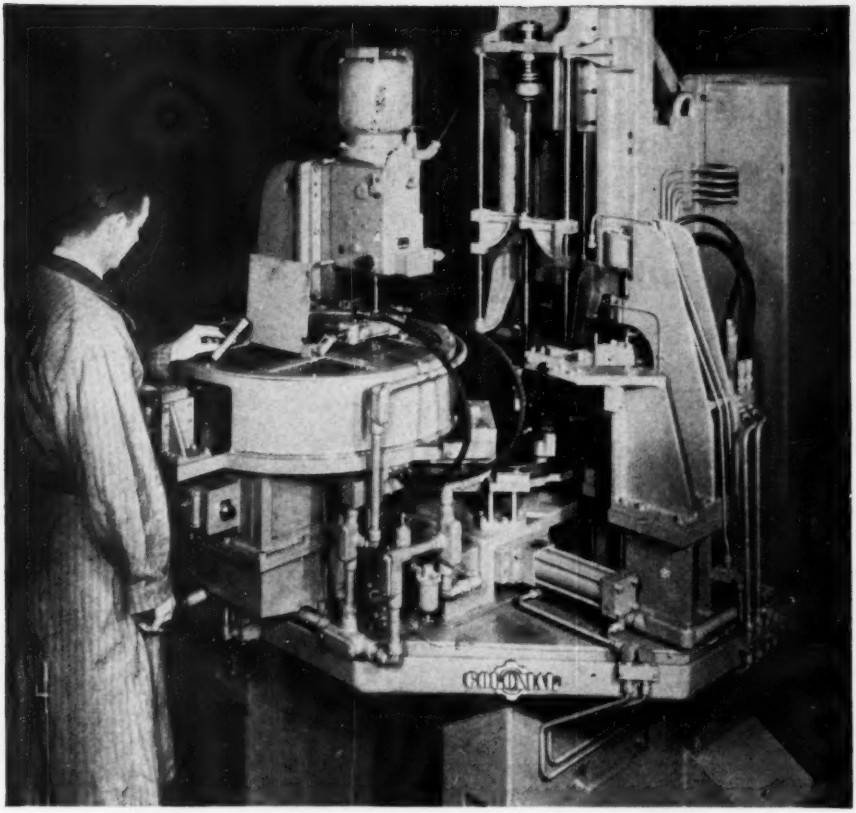
Among the cost-saving features of Greenlee Automatics, one of the most advantageous is the arrangement whereby *any* of various standardized tool holders will fit in *any* of the six cross-slides. This means not only no limitations as to what tools can be used in which positions, but also a minimum requirement for investment in tools, and a maximum of speed in tool setting when changing over between jobs. *You can profit* from this and the many other outstanding features of Greenlee Automatics.

Write for FREE Literature

Send today for your copy of our 20-page booklet describing and illustrating all the Greenlee features.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1842 MASON AVE., ROCKFORD, ILL.



BROACHING—"PLUS"

200 finished pieces per hour

This Colonial 6-ton 24-inch stroke pull-down machine, broaches, drills and stamps more than 200 camshaft sprockets per hour. Cycle is completely automatic as follows: 1) drill .2656" hole in web, 2) broach .1895" keyway in bore, 3) stamp timing mark on sprocket, 4) eject completed parts onto a conveyor. Operator merely keeps loading magazines filled with parts.

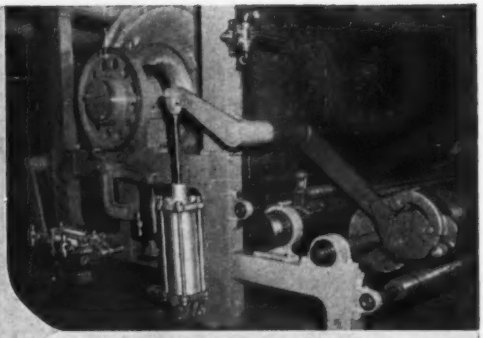
Broaching-"Plus" is a new trend in broaching machines today. Integrating broaching into a machining sequence on a part, so that the operator has less work handling, cuts costs and speeds up processing.

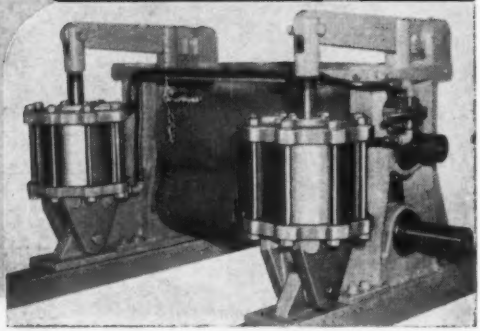
Colonial Broaching-"Plus" machines can perform multiple operations on your parts. For information on how your costs can be cut, send your prints and production requirements to Colonial Broach Company's Engineering Department.

UNIFIED BROACHING is the key to successful broaching

COLONIAL BROACH CO. DETROIT 13

CLOTH-FINISHING MACHINES ... *employ* NOPAK Cylinders to Raise and Lower Rollers





The David Gessner Company, Worcester, Mass., manufacturers of modern cloth finishing equipment, employs NOPAK Air Cylinders in its sizing machines to raise and lower heavy rollers, and, in some cases, to equalize roller pressures. The examples pictured may suggest how you, too, can use NOPAK Cylinders, controlled by NOPAK Operating Valves, to build accurate, simplified machine movements into your plant equipment, or into machinery that you manufacture for resale.

The NOPAK Application Manual shows you how NOPAK Valves and Cylinders are being used in all types of industry, in many types of machinery and equipment for pulling, pushing, lifting, lowering, clamping, positioning. If you haven't seen a copy, ask your NOPAK representative, or write.

GALLAND-HENNING NOPAK DIVISION

2754 SOUTH 31ST STREET • MILWAUKEE 46, WISCONSIN

Write for Bulletin SW-2

•

Representatives in Principal Cities

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

LARGE

or small...

DAVIS

IS THE FIRST NAME TO CALL WHEN YOUR MACHINING NEEDS

Job-Engineered

SPECIAL TOOL DESIGNS

26 CUTTERS ON THIS SPECIAL TOOL BORE, TURN AND FACE HOLES RANGING FROM 22.500" TO 55.75" IN DIAMETER

2 BLOCK-TYPE CUTTERS IN THIS SPECIAL TOOL ROUGH, FINISH AND COUNTERBORE HOLES RANGING FROM 2.180" TO 2.420" IN DIAMETER

Yes, large or small, simple or complex, you always tool jobs better with Davis. One reason is the big, extra bonus of machining know-how that goes into every Davis tool.

In the design of special tools, like those above, Davis' broad experience and unsurpassed engineering skill assure recommendations complete in every detail of speeds, feeds, fixtures and maximum combination of multiple operations into single tools for increased production at lowest cost.

DAVIS ALSO OFFERS INDUSTRY'S MOST COMPLETE STANDARD TOOL LINE

In standard blocks, boring heads, bars, and tool sets, the Davis line features thousands of items to assure unrestricted selection in tooling up virtually any routine job.

Your local Davis Field Engineer is as close as your telephone, and behind him are the complete facilities of Davis' application engineering department, ready to serve you with special or standard tools.

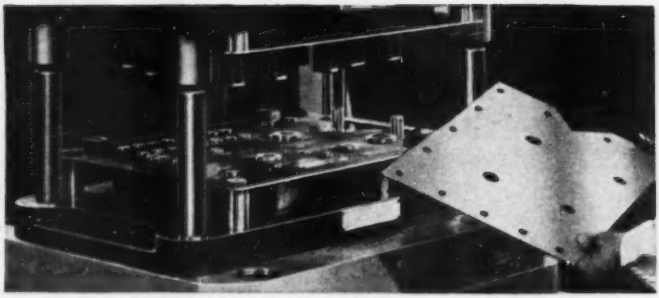
DAVIS

BORING TOOL DIVISION of
Giddings & Lewis Machine Tool Company
Fond du Lac, Wisconsin

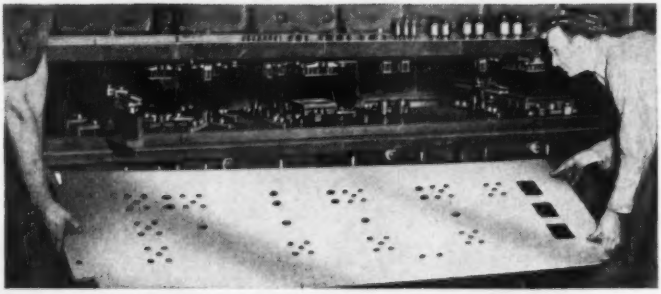
THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING

OVER 2,000 PLANTS

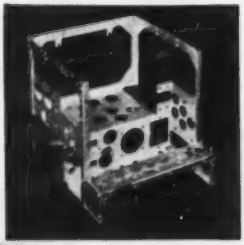
are making up their Metal Perforating Die Sets by Whistler methods



WHISTLER MAGNETIC PERFORATING DIES



WHISTLER ADJUSTABLE PERFORATING DIES



- Lower die-making costs.
- Start production quicker.
- Save work handling labor.
- Increase press production.
- Versatile in job application.
- Perforate materials to ⅛" thick mild steel.
- Combine horizontal and vertical perforating operations.
- Work in practically any size or type of press.
- All parts re-usable and interchangeable.
- Precision assured on short or long runs.
- Parts interchangeable right in the press.
- Magnetic dies assembled on templates.
- Adjustable dies assembled on Tee slot die sets.
- Save floor and storage space.
- Die investment not "tied up."

SEE FOR YOURSELF *Without Obligation*

Our *illustrated* Catalogs show the simplicity, economy and versatility of Whistler methods. See for yourself why Whistler customers are the biggest names in industry.

WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST

S. B. WHISTLER & SONS, INC.

746 Military Road **Buffalo 23, New York**

Featured IN THIS ISSUE

Vacuum Metallizing—New Low-Cost Method of Finishing **157**
Time Study . . . Part 5 ..... **191**
Carbide Broaching Future Appears Bright **236**

How's Business? The Chamber of Commerce claims that business is better and gives the reasons why. The aircraft industry is also flying high. The Aircraft Industries Association of America, Inc., claim that for the first time in history, more jet aircraft than piston-engined planes were produced in the U.S. Page **149**

Vacuum Metallizing . . . New Low Cost Method of Finishing Metal Products. By J. Gordon Seiter, manager of Vacuum Metallizing Div., of F. J. Stokes Machine Co., Philadelphia, is an article which covers the newer designs of vacuum metallizing units. It also points out that techniques have advanced tremendously and the process now enjoys many practical industrial applications. Page **157**

New Template Duplicator, by Frank Charity, covers a new machine tool developed by Northrop Aircraft, Inc., which is being used to produce duplicate templates and related types of articles with tolerances of plus or minus 0.005" in about a tenth of the amount of time it would normally be required to do such work. Page **175**

Multiple Clamps for Jigs and Fixtures, by Tom Brown. The author discusses multiple clamps and their applications. Another name for multiple clamps is single-lever or knob clamps, and a single clamping movement can be used to operate several other clamping levers or devices, together with locating plungers and the like. Page **181**

Time Study . . . part 5, by Harold R. Nissley. This is the fifth part of a series on time study, which began in August. The present article deals with supervisors' responsibility in incentive programs; incentives for supervisors; deviations from standard work pattern; and how to pay multiple machine operators. Page **191**

Cutting Force: Its Effect on Machine Design, Workpiece, Positioning, Maintenance, by Horace A. Frommelt, consulting engineer, is an article in which the author discusses the effect of cutting forces on both design of machine tool as well as that of workpiece. Mr. Frommelt claims cutting force is the most important factor in machining. Page **198**

Adhesive-Setting Jig is Transportable, by George Middlebury. This article explains platform-type scales which are manufactured in large batches at Avery Ltd., Yorkshire, England. The feature of the scale is a rubber mat fixed by adhesive to the platform. The advantage of this jig include mobility and less labor. Page **215**

Carbide Broaching Future Appears Bright, by E. H. Graf and Cam Morawski, Detroit Broach Co., deals with the problem of broaching such hard forms as stainless steel. Article also covers new 100" stroke, 15-ton dual ram vertical hydraulic, high speed surface broaching machine. Page **236**

Management Communicates Ideas Through the Spoken Word, by George Allison, deals with the verbal and written English language used by supervisors and foremen in directing their workers. The article urges management to accept its responsibility of using easily-understood language to communicate ideas and orders. Page **243**

How a 32" LeBlond

takes a measured 118-HP cut

Wanted. *A 32" lathe to stand up under 100-plus horsepower cuts. Must also provide unusually-wide range of feeds and infinitely-variable speeds.*

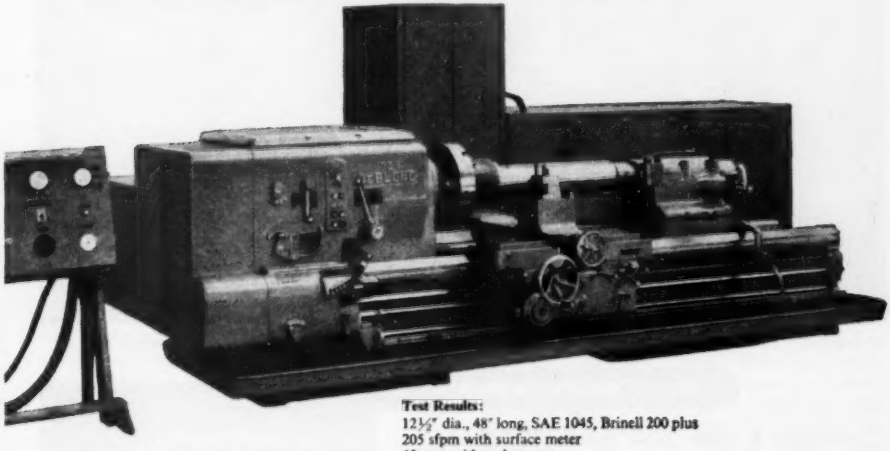
No standard model could fill these requirements. But our new 32" Heavy Duty had the ruggedness that was needed. We made some changes, mainly in the headstock, and produced a 32" lathe with these specifications:

Drive; 125 hp, variable speed.

Speeds; infinite from 42 to 1400 rpm.

Feeds; 56 from .002 to .250 ipr.

Plus these features that are standard on our 25" and 32" lathes: 4-directional power rapid traverse built into apron; one-piece double-wall apron, hardened rack; totally-enclosed quick-change box; hardened and ground replaceable steel bed ways; thrust-lock tailstock.



Test Results:
12½" dia., 48" long, SAE 1045, Brinell 200 plus
205 sfpm with surface meter
63 rpm with tachometer
.083" feed per rev.
1" depth of cut
2 hp reading on meter before cut
120 hp reading on meter during cut
118 net hp at the cut

This lathe, with variations to suit your needs, is now available. It appears to be well-suited to very high production turning of large forged or cast-steel shafts and rolls. For quotations against your specifications, get in touch with the nearest LeBlond Distributor or write Cincinnati direct.

. . . . cut with confidence

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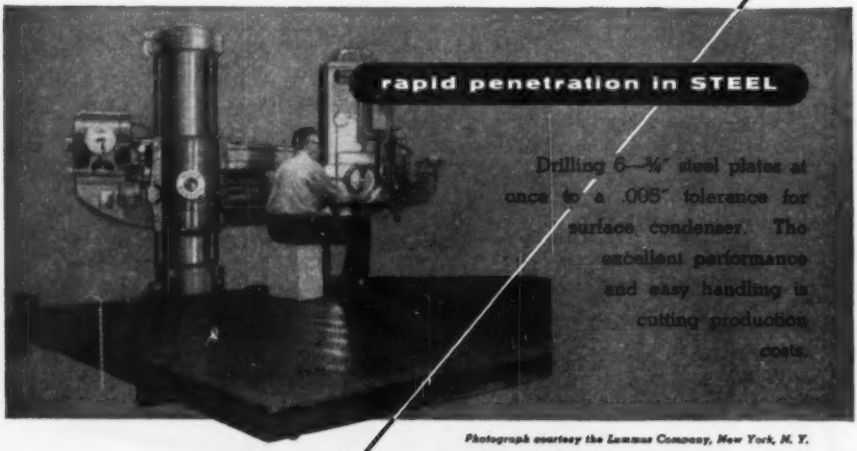
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 67 YEARS.*

rapid drilling with ACCURACY saves money

at THE LUMMUS COMPANY

On jobs like these the ease of control, the accuracy and the outstanding speed of penetration of Cincinnati Bickford Radial Drills pay big dividends.



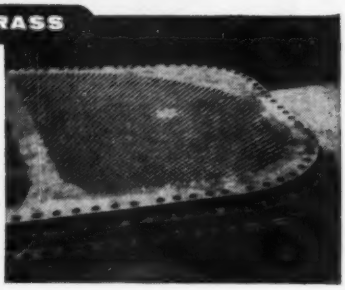
rapid penetration in STEEL

Drilling 6—¾" steel plates at once to a .005" tolerance for surface condenser. The excellent performance and easy handling is cutting production costs.

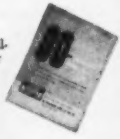
Photograph courtesy the Lummus Company, New York, N. Y.

rapid penetration in BRASS

Drilling 4 brass tube sheets, 1½" thick, simultaneously to a .002" tolerance, a special spiral brass drill penetrates at the rate of 10" per minute.



Of interest to every user of Drilling Machines—Write for your copy of 80-year Anniversary Booklet.



CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

AS THE *Editor* SEES IT

Break It Down!

You've probably torn your hair in angry frustration innumerable times upon seeing a child break a toy which you've given him. (You were probably equally as destructive as a child.) It's too bad that not more of us have carried that habit from childhood into our adult lives, for breaking a toy is merely breaking an item down into its simplest forms and analyzing the component parts. This is not only curiosity but also sound engineering; but the older we get the less curiosity we seem to have and the less this important engineering trait is used.

Only by analyzing every product from the drawing board to the shipping dock can we effect savings. The majority of manufacturers are following too many antiquated procedures either in the design, the manufacture or the shipping of a product; it's been done that way for 'lo these many years; 'you really can't change much here. We've gone over it with a fine tooth comb'. Maybe we shouldn't use combs to go over a problem, but use merely sound common sense.

Starting with the design: can those corners be made square instead of round, thus eliminating a costly form milling operation? All these holes, are they necessary? Must there be twenty different parts each with a hole in a different location? Can we use clips to hold these light components together? It would eliminate a lot of drilling and tapping, to say nothing of bolting them together.

What about the actual process of manufacturing the product? Do you have a battery of drill presses with thirty pairs of arms flapping about like migratory ducks? Wouldn't it be smarter to build a special machine? There'd be less flapping and at less cost.

Have you looked into welding seriously? Can weldments be substituted for castings? How about jigs and fixtures? Money is being saved by making welded jigs. Have you investigated plastic dies?

There exists a direct relationship between design and shipping in the selection of shipping cartons. Do you really need fifty different sizes on this product—each one with a special carton? Can't these be standardized somehow? Can you put one hundred small parts into one carton instead of wrapping each part by hand and sending it out in a special container? Why not throw the entire carton and container problem into the lap of a container manufacturer and tell him to save you 10% on your container costs. He'll probably save you closer to 25%. For that matter, why no throw open some of your machining problems to a machine tool builder and instruct him to save you at least 30% or don't come back. The builder will come back with the 30%.

One manufacturer told me that he used to make his profit on the drawing board and throw it out of the back door in a carton. After a bit of soul-searching and manufacturing and shipping analysis he still makes his profit on the board, but now he puts it into the cash register. Break the product down, analyze it and you'll make a healthier profit.

William F. Schleicher

Just an Idea... but, it carried a garage-born business to the top of a vital industry

HARVEY B. WALLACE
Founder and President

The idea was brand new but, we believed in it.

Diamond tools were thousands of years old but, ENGINEERED DIAMOND TOOLS, such as we set out to make in our garage workshop forty-four years ago, those were something new. And, like all new things, they had to be sold in the face of doubts and misgivings.

Nobody had ever before undertaken to "engineer" diamond tools to do specific jobs–but, *we* did.

Nobody had ever guaranteed diamond tools to do their jobs but we not only guaranteed our ENGINEERED DIAMOND TOOLS to do their job but guaranteed that they would do them better than any ordinary tool.

And, we kept proving it, over and over, until industries small and large knew that diamond tools engineered by Wheel Trueing represented the highest technical achievement in the industrial diamond world. Presently this idea was extended to mining operations and, later to oil field operations when we successfully pioneered oil field diamond drill bits, now used throughout the world. And, every mail carried packages of Wheel Trueing diamond selections to discriminating diamond buyers throughout industry.

Our plant has grown to be the finest in the industry and our original group of three people is now a family of two hundred, many of them outstanding specialists.

Our idea of ENGINEERED DIAMOND TOOLS is no longer ours, alone. It is now shared by all industry and practically every product of modern industry is made better, and at less cost, because of it.

There's no substitute for diamonds

Radius Forming Tools
"Tru-Line" Profile Dressing Tools
Diamond Grit Tools for Thread Dressing
"Tru-Thread" Thread Dressing Tools

MEMBER

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Canadian Plant and Offices:

WHEEL TRUEING TOOL COMPANY OF CANADA, LTD.

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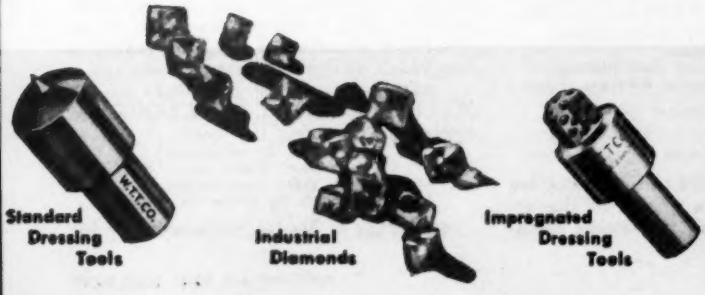
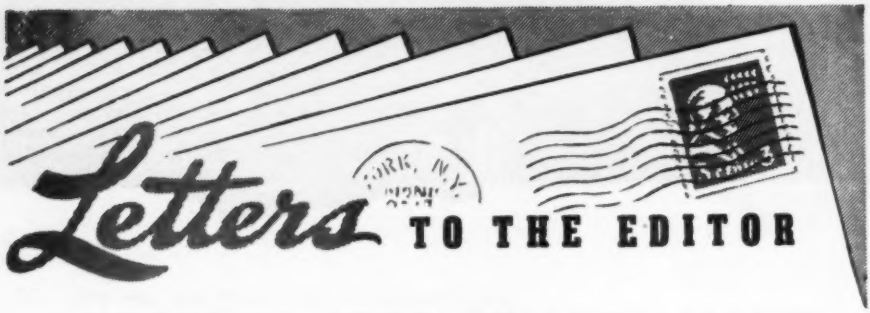




Portable Air Tools

We are very much interested in the excellent article you ran in MACHINE and TOOL BLUE BOOK concerning the "Dollar Wisdom of Using Portable Air Tools," and would like to use some of the material.

We feel this woud be a good story for the readers of our company newspaper, the Thor Scoreboard, and would like your permission to use the editorial part of the article, with credit, of course, to MACHINE and TOOL BLUE BOOK.

G. A. Thoma, Sales Promotion
Thor Power Tool Co.

Glad to grant Thor permission to reprint.

Quality Control of Gears

We have received a request from our affiliate company in Great Britain for six copies of "Quality Control is Key to Gear Manufacture at Harvester's Tractor Works."

They advise that the above was reprinted from the MACHINE and TOOL BLUE BOOK.

We would appreciate your sending six copies of the reprint if they are available, to the attention of the undersigned.

Erl Tronnes,
Pub. Adv. and Publicity
International Harvester Export Co.

Honeycomb Process

While reading Letters to the Editor we note requests for tear sheets of the article "New Honeycomb Processing Method" by Frank Charity. May we have tear sheets of the same article?

Wm. A. Jecuson, Ind. Eng.
Overhaul & Repair Dept.
U. S. Naval Air Station
Quonset Point, R.I.

When Drilling 1½" to 5" holes . . .

In your magazine of April, 1954, there appeared an article, entitled "When Drilling 1½" - 5" Holes, Spade Drills are Economical . . . Efficient" by William F. Schleicher. Would you please send me three copies of the above article?

G. J. Bryant
Ind. Eng.
Baldwin-Lima-Hamilton Corp.
Eddystone Div.

Will you please furnish us with six reprints of the article "When Drilling 1½" to 5" Holes . . ."?

F. L. Kolts, Buyer
International Business Machines Corp.

Reprints sent.

A Discrepancy and Another Idea

. . . . I am probably not the first to call your attention to an apparent discrepancy in the sketch of a safety hook for heavy shafts by Roger Johnson (Sept. p. 228). However, you may be interested to know that I believe this grab to be somewhat superior, if properly made, to one which we designed not too long ago.

I usually watch for the kinks in the MACHINE and TOOL BLUE BOOK and appreciate receiving my copy.

Roy A. Sternaman,
Asst. Works Mgr.
Delta Star Electric Div.,
H. K. Porter Co., Inc.

An orchid to reader Sternaman for his

astute eye and money for his sketch of the type of grap developed by Delta. The sketch appears in the Shop Hints section in this issue.

Shop Hints or Kinks are always welcome. The drawing can be rough and done in pencil on the back of a wrapping bag. You can cash the check we send at the super market. Incidentally, how many other readers can find the error in the drawing?

Information, Please

Could you inform us who the manufacturer is of the 12" Vernon Shaper?

O. J. Dorr, Director
The Vocational and Adult School
Fond Du Lac, Wis.

The Vernon Shaper is now made by Sheldon Machine Co., 4242 No. Knox Ave., Chicago, Ill.

Please advise us who can supply us with parts for the La Salle surface grinder made by the La Salle Machine & Tool Co., La Salle, Ill. As far as we know this company does not exist any longer and we are in need of certain replacement parts.

Charles G. Horn, General Mgr.
Eldeen Manufacturing Co.
612 W. National Ave.
Milwaukee 4, Wis.

We've hunted and searched, telephoned and wired, and exhausted every known means of tracking down the information. No success. Everything concerning the La Salle grinder seems to have disappeared. If any readers can help reader Horn we're sure it will be appreciated.

Time Study

There has been a great deal of interest here in the articles by Harold R. Nissley and we would appreciate your forwarding to us three reprints of the articles already printed. If you cannot spare this number anything you can give us will be appreciated.

We would also like to have tear sheets of the coming articles if we can apply for them at this time. We also notice that mention is made of the March issue of which we have been unable to find a copy. If you have a reprint of the article "How To Make Your Time Study Standards More Accurate And More Salable," we are sure it will be of value to us.

F. G. Wilson,
V. P. charge of Mfg.
Waterbury Companies, Inc.

I would very much appreciate receiving reprints of first and second articles of Harold R. Nissley on Time Study which I enjoyed so much I want to make up a special folder for same. Enclosed find postage and addressed envelope for same.

May I also compliment you for carrying such useful articles in your publication.

Walter R. Putz, Supt.
National Brush Company

Please send me two copies of Harold R. Nissley's two articles on Time Study.

B. S. Sleeper,
Supv. Mfg. Methods & Time Standards
General Electric Co.,
San Jose, Cal.

. . . . a copy of the reprint on Time Study.

C. H. Schenk, Head Ind. Eng.
Stewart-Warner Corp.

. . . . two reprints of articles on Time Study.

C. R. Fay, Chief Ind. Eng.
Schick, Inc.

. . . . send us reprints of articles on Time Study.

H. Iversen, Methods Dept.
Link Belt Co., Chicago

. . . . please send reprint. . . on Time Study.

J. O. Amstuz, V.P.
Behr-Manning Corp,
Div. of Norton Co.

. . . . Time Study.

F. A. Lucas, Plant Ind. Eng.
Bethlehem Pacific Coast Steel Corp.

. . . . Time Study

Frederick S. Blackall, Jr.,
Pres. & Treas.
The Taft-Peirce Mfg. Co.

Reprints of the first three articles of Nissley's Time Study have been distributed. A few remain. If you want a set drop us a line. The fourth article will be reprinted shortly. It is planned to reprint the entire series in booklet form when it is concluded.

50,000-ton Presses

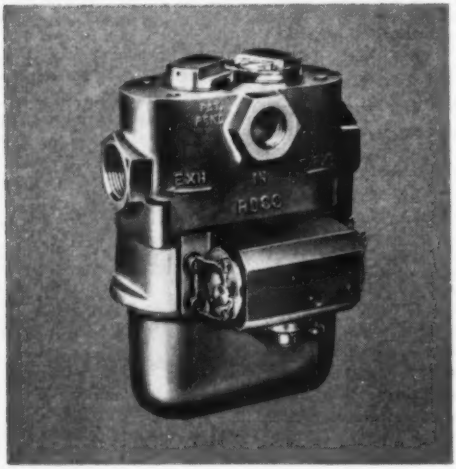
In one of your last year's issues you ran an article on a very large Forging Press which is mentioned partially in the enclosed clipping.

Would it possible for us to obtain a copy of the article. The writer is attempting to obtain the more complete specifications which you had in your article.

E. K. Parkinson
Moore Bros. Machinery Co., Ltd.

Ross

LIFEGUARD



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SAFER PRESS OPERATION

Write for Bulletin 306

Tomorrow's EnginAIRing Delivered Today

Control

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LAST MINUTE WASHINGTON NEWS

★★★

by Arnold Kruckman

Washington Correspondent

ARMY AND NAVY AWARDING CONTRACTS TOTALING OVER ONE BILLION DOLLARS

The Army and Navy have announced that they would spend over a billion dollars on production and procurement contracts before the end of the year. Of this sum over $100 million is designated for "long lead time machine tools and equipment which are not used in general manufacturing."

The Army plans to award $300 million worth of contracts of all kinds, and the Navy almost $700 million worth, while the Air Force contracts already let and to be completed in negotiations total more than 1.3 billion. Thus the total, including those let in July, and at intervals since, for all Services, gross almost $3 billion for defense purposes.

The United Aircraft Corp. received the largest dollar volume for a single company during October. Its contracts totaled approximately $200 million. The Grumman Aircraft Engineering Corp. received the largest volume for a single air frame contractor with four awards totaling over $175 million, of which $150 million were production orders for the new F-9 Tiger Supersonic Carrier Fighter.

Douglas Aircraft Co. had a shower of seven contracts which totaled between $130 million and $145 million. Chance Vought Aircraft, Inc., received a $50 million contract for the design of a carrier fighter; and McDonnell Aircraft Corporation was given an award of $40 million for the development of an advanced experimental all-weather attack fighter-type design.

Orders for more North American fighter planes reached the total of $40 million; and Lockheed received an aggregate of more than $50 million worth of orders. Martin got $12 million worth and Hiller Helicopter got one order for $600,000. It should also be noted that a considerable part of the late business was

awarded to Ordnance and Signal Corps, and included much electronic equipment, ammunition, radar motor locators and similar articles.

UNITED STATES NAVAL POWER EQUALS ALL OTHERS COMBINED

The fighting power of the United States Navy now equals the combined strength of all other major navies of the world. We are making greater scientific strides in Naval equipment than any other nation. "Jane's Fighting Ships," one of the oldest and most reliable standard reference works on the world's Navy, gives us credit for more than 5,000 vessels in the largest peace-time fleet ever maintained by any nation. While the Russians have more submarines, the United States has 101 fleet and escort aircraft carriers as compared with none for Russia; 15 battle ships compared with Russia's 3; 75 cruisers against Russia's 26, and 737 destroyers and destroyer-escort types against Russia's 138. The report also stresses that we are putting a great deal of emphasis upon the development of guided missile ships, and urges that there should be close co-operation between the United States and Britain in further development of this type of craft and weapon.

MORE MACHINE TOOL ORDERS FROM INCREASED NAVAL NEEDS

As is obvious, orders for more machine tools are imminent, with the accelerated production of Naval equipment. Machine tools, and allied equipment, come under the general supervision of William Lawrence of the Office of Defense Mobilization. In a meeting held late in October at the U. S. Chamber of Commerce in Washington, Mr. Lawrence stated that the majority of the machine tools then being ordered would be installed in plants that will use them in war time, and that a very considerable number of them will be used in aircraft production. He stressed that, except in rare instances, they will not be used for current production.

Lawrence made clear that the ordering of these tools is consistent with Administration efforts to plug as rapidly as possible any gaps in the industrial mobilization base. He admitted that the Defense Department received this $100 million from Congress two years ago but did not use the funds because, said he, the Services were not sufficiently advanced in their planning to make up their minds about types and sizes of tools that would be needed for new weapons.

ODM TO CONTRACT WITH PRIVATE PLANTS TO MAINTAIN TOOLS, EQUIPMENT

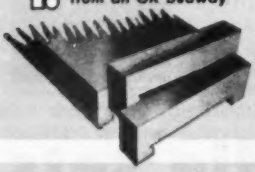
It is the plan of the Office of Defense Mobilization to enter into contracts with ten to twelve thousand privately owned plants for the maintenance of Government-owned tools and equipment, having in mind the prospect of needs with future mobilization, Lawrence disclosed. It was estimated that the "complete maintenance program for each individual plant will cost $350,000 annually."

The Federal Government is making a study of the supply and demand picture of approximately 50 common components, such as

HOW HARD are OK hardened ways?

ONE CUSTOMER SHOWED US BY:

1. Taking a section from an OK bedway



2. Making it into a "tool bit"

3. Then cutting metal with it (1045 cold rolled steel)

The Gisholt Machine Co., Madison, Wisconsin, who use Ohio Knife bedways exclusively on their ram and saddle type Turret Lathes, made the above dramatic test for one of their customers. RESULT—another sale of a famous Gisholt Turret Lathe.

This super uniform hardness on the wear surfaces to a depth of 3/16" (64-66 Rockwell "C") is the reason why more and more OK ways, gibs, races, etc., are being specified on new equipment and used as replacements where former parts have failed. OK ways are practically wear proof assuring constant accuracy throughout the life of your machine. Enjoy with many prominent machine tool builders and users, the long wearing, supreme accuracy, super hardness of OK ways. Many sizes, shapes, etc., available, or made to your specifications.

OK wear strips are now available in welded Ampco bronze.
(Reg. U. S. Pat. Office by Ampco Metal Inc.)

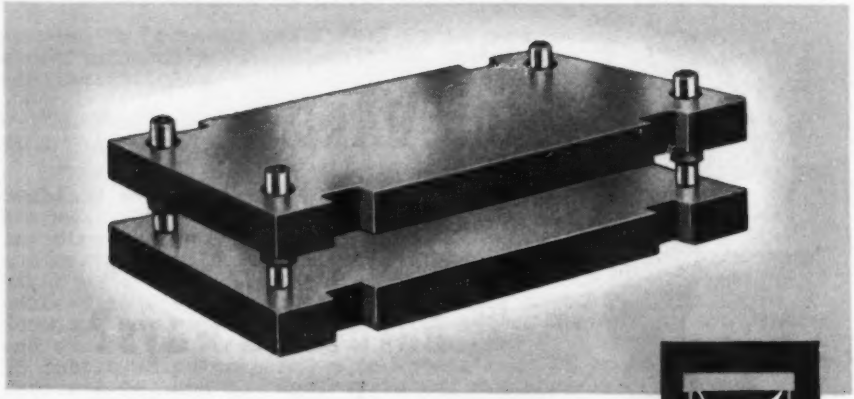
Manufacturers for the Metal Working Industry of:

SLITTER KNIVES • SHEAR BLADES • ROTARY SHEAR KNIVES
HARDENED SPACERS • HARDENED WAYS • GIBS
BALL RACES • BRONZE WAYS • WEAR STRIPS

Write for comprehensive Bulletin to Dept. 34-D.

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO



FORTIFY EXPENSIVE DIES
with dependable, top-quality

detroit die sets

Smallest cost of a mounted die is the die set . . . often only a fraction of the total. Saving a few dollars on a die set may run up other costs, such as in re-working the set in your shop, in mounting, in interrupted production. When you specify a Detroit Die Set you get the accuracy and the quality you have a right to expect . . . and without paying a premium.

Detroit
DIE SET
CORPORATION

Call "Detroit"

2895 W. GRAND BLVD.
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BALTIMORE . . . PL 2-4641	FLINT, MICH. . . . 5-7361	NEW ORLEANS . RA 6528
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CHICAGO . . . PU 5-0500	INDIANAPOLIS . . HU 5604	PITTSBURGH . . LO 1-4011
CINCINNATI . . HU 7775	KANSAS CITY, MO. VI 3558	ROCK ISLAND, ILL. . 8-2814
CLEVELAND. . . TO 1-0860	LOS ANGELES . . AD 7251	ST. LOUIS . . . FR 1-6810
DALLAS . . . . TE 5029	MILWAUKEE . . GL 3-7170	SEATTLE. . . . EL 1454
DAYTON . . . HE 3042	MINNEAPOLIS . . OR 3-7980	TOLEDO . . . MA 4510
DECATUR, ILL. . . 8-3474	NASHVILLE . . . 6-2597	TORONTO, CAN. . KE 2972
DENVER. . . . SH 2451		WASHINGTON, D.C. AD 4-5700

anti-friction bearings, fractional horsepower motors, and the items which have been bottle-necked in past emergency periods, according to Lawrence. The studies are expected to be practically without expense to the Government by reason of the contributions of time and facilities of the industries associated with each special study. When deficiencies develop in the capacity of the members of the industry the Government plans to procure the funds to buy the tools and equipment necessary to increase the capacity of the mobilization base.

RESULTS OF TASK FORCE STUDIES ARE JUDGED BY HOOVER COMMISSION

The Hoover Commission has begun to evaluate the results of the studies by the various Task Forces which were given the job of finding new ways and means to streamline Government operations in order to save money for the Government and to reduce taxes. The Commission is aiming sharply at the effort to take the Government out of competition with private business.

The studies began in September, 1953. Most of the directing personnel are business and professional leaders who serve wholly on a voluntary basis without compensation. The staffs are made up of technicians recruited from professional groups or loaned by business. The results of the reports made to the Commission are to be laid before Congress in January. The preliminary report is to be supplied by December 31 and the final recommendations by May 31, 1955. The Commission will make suggestions about Constitutional Amendments, legislative enactments and Administrative actions.

Eighteen Task Forces have carried on intensive studies. Their reports will cover Intelligence activities, overseas economic operations, budgeting and accounting, business organizations of the Department of Defense, business enterprises in the Department of Defense, transportation, legal services and procedures, lending agencies, surplus property, water resources and power. It is desired and anticipated that the activities of the Commission will continue strong and well organized for a considerable time in order that the best possible results may be obtained.

DOMESTIC EMPLOYEE PAYROLLS TOTAL $10 BILLION PER YEAR

The payrolls for domestic employees—meaning those engaged in the work of the offices and bureaus within the United States —total $10 billion per year; the reports covering Federal personnel and payrolls each year disclose an increase in the numbers employed and in the amount of the payrolls. The payrolls do not include the cost of maintaining the necessary housing and other equipment essential for the operation of the bureaucracy. It is estimated that in the United States alone this does not go below $4 billion, and probably runs nearer $5 billion each year. Thus, to operate the bureaucracy of the Federal Government costs at least somewhere around $15 billion annually for payrolls and the essential housing and machinery.

This does not include the huge civilian personnel which is maintained in Europe, Asia, Africa and in other parts of the

FOR EXTERNAL THREADING BY AUTOMATICS

A 1¼" JX LANDEX Head on a 1¾" Warner & Swasey Automatic is shown threading ¾" Press-Lock spuds. 1" Straight Pipe threads are cut on B-1113 steel, with an average of 3000 pieces threaded between chaser grinds. These spuds are one of the many types of industrial hose couplings and valves produced by the Dixon Valve and Coupling Company of Philadelphia.

The LANDEX is a yoke-operated head compactly designed for use on live-spindle machines where die head clearance is limited. They are built in ½", 13/16", 1¼", and 2" sizes, and each size will cut a wide range of thread diameters. For example, the 1¼" LANDEX shown will cut threads ¼" to 1¼" in diameter, and oversize chaser holders (available for all LANDEX JX Heads) will allow cutting thread diameters up to 2¾". Write for Bulletin F-90.

LANDIS Machine COMPANY
WAYNESBORO, PENNA.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

370

world. These, aside from the payrolls, also require housing and essential equipment. Also, these estimates do not include the cost of the maintenance of military personnel at home and abroad. The latest report to the Congress claims that there are 1,146,916 persons in the Army, Navy and Air Force. It shows that the annual payroll for these combined Services is $4,475,544,000. Thus, it would appear the combined payroll of the civilian Federal employees within the United States, and all the personnel of the Army, Navy and Air Force makes a gross total of $14,475,544,000 annually; and this does not take into account the civilian payrolls outside of the United States.

PUBLIC AND PRIVATE DEBT INCREASES REVEALED BY STATISTICIAN

In the light of these official figures it is interesting to contemplate the figures given in the news bulletin issued by Paul O. Peters, Washington statistician. At the end of October he reported that since December, 1953, the net public and private debt of the people of the United States has jumped from $585.5 billion to $641 billion. He said that part of the gain in the debt was due to an increase in the Federal public debt from a net of $275.283 billion to $278.775 billion. The non-farm mortgage debt rose by approximately $5 billion and all other categories of debt increased as commercial and business firms lowered the credit requirements in competition for public dollars which became less plentiful in 1954. Mr. Peters stressed the point that the Government largely collects taxes from the producer and the merchant before the goods are sold, and thus is always living on funds assembled before the cash has been collected for them.

STORAGE OF MACHINE TOOLS SUBJECT OF RECENT ADDRESS

In a recent address here in Washington, Director Arthur Flemming, of the Office of Defense Mobilization, called for the storage of machine tools, and the preservation of a hard core of technical and management personnel to keep the machine tools up to date and in plentiful supply.

Various Government agencies, making trade reports, feel that there has been a modest pickup in orders since Labor Day. They say that manufacturers, trade shows and wholesale markets report increased buyer interest. Consumers are still spending at near-record rates. They tell us that the extraordinary activity in construction, both residential and non-residential, not only strongly supports business but is heartening in every way.

LOOK FOR 4TH QUARTER GAIN IN STEEL MILL OPERATION

The recent contracts awarded by the Defense Department should give industrial production a shot in the arm that will speed it up considerably beyond the spring low, as measured by the seasonally adjusted Federal Reserve Index. The above mentioned agencies think that steel mills will materially increase their operations and show a definite gain in the fourth quarter.

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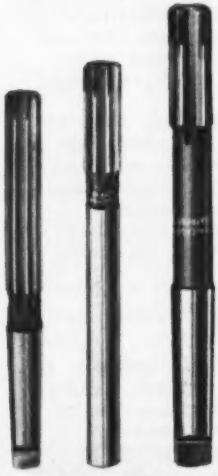

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How's BUSINESS ?

Why Business is Better

WASHINGTON . . . Chamber of Commerce of the U.S. names four reasons why business is getting better:

1. Income after taxes is at an all-time high.
2. Foreign trade is improving.
3. Unemployment insurance claims are declining.
4. The inventory situation has improved considerably.

The nation is selling more and consuming more than it is producing, so production is bound to increase. The Chamber points out one more reason for the continuing boom in construction: Movement of population from the cities to the suburbs, with the resulting need for new utilities, transportation facilities, schools, churches and shopping centers. This in turn, attracts more people—and provides more work and demand for more goods.

Sales orders show increase

WASHINGTON . . . A recent survey by the National Association of Purchasing Agents indicates a steady increase in a tightly competitive market. Reports of increases in new orders and production outbalance decreases 3 to 1. The improvement in orders is even better than that of production heralding higher production to come.

Prices, in general, are showing more strength and stability, and inventories are lower with a strong trend to stabilize. Employment continues to rise, and prospect appears good for further hiring during the first half of 1955 at least.

Buying policy, although conservative, will likely become more liberal—60 days and up.

Aircraft industry flying high

For the first time in history, more jet aircraft than piston-engined planes were produced in the U.S. in 1953. According to the Aircraft Industries Association of America, Inc., sales for the 12 leading aircraft companies in 1953 hit $5.1 billion, a figure topped only in the war years of 1943 and 1944. And with unfilled orders currently amounting to about $11.6 billion, prospects continue good. Here are some reasons why:

Every fighter plane in combat units of the Air Force today is jet propelled, 23 wings of the Air National Guard are almost 100 per cent equipped, and a large percentage of bombing wings are following. Because higher speed and altitude operations shorten plane life, this assures the industry of an important replacement market, in addition to new plane sales.

Forty-four major industrial and scientific organizations are at work on prime contracts for guided missiles. At the beginning of this year, contracts totalling over $1 billion were held by the industry, and the administration is seeking additional defense funds for work in connection with guided missiles.

American-built aircraft continues to dominate world markets. Aircraft industries reports that industry exports in the seven-year period ending last year amounted to $2.5 billion, with nearly $294 million of that going to civil aircraft sales. Chief foreign mar-

kets include Canada, Netherlands, France and Argentina.

Small Business Administration

WASHINGTON . . . The benefits of installing a sound wage incentive plan in a small business are explained in a leaflet issued by the Small Business Administration.

"The wage incentive itself arises out of a premium given the worker for extra production. It is usually accomplished by giving the worker all, or some portion, of the production cost savings which result from the increase," the leaflet explains.

Some of the objectives of the wage incentive plan for management and employees are:

For Management: Lowered costs resulting from increased productivity; improved cost control leading to production which is more consistent, more uniform and less variable in actual costs; improved facility utilization; and improved worker morale as earnings become proportionate to individual effort.

For Employees: An opportunity to earn money in excess of the base rate; an opportunity for individual recognition; and opportunity for healthful competitive spirit among employees, at least partially, to control the levels of their standards of living by their own initiative.

"Have you given any thought to a retirement plan for me?"

WASHINGTON . . . The National Chamber of Commerce's Taxation Committee which recently held a meeting here gave serious study to this problem: How to attain a more even balance of federal revenue sources?

Lending emphasis to this problem is the need for a tremendous amount of capital investment in order to keep our economy growing. That was the reason the last Congress gave partial relief from the double taxation of dividend income of individuals. It was hoped that a more realistic dividend tax policy would encourage investment in business and industry and thus create new jobs.

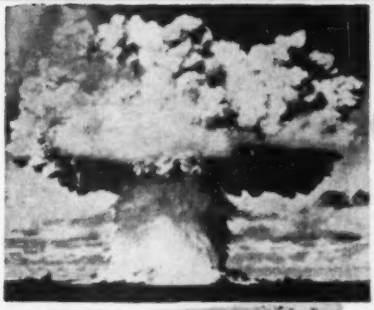
Canada is already far ahead of us in her dividend taxation, providing almost complete relief from taxes on dividends paid by small corporations, and much greater relief than we get from taxes on dividends paid by large corporations.

But relief from the excessive taxation on dividends is only part of the process of attaining a balanced tax system. Perhaps an even more effective method would be to remove the disproportionate stress on individual and corporate income taxes.

The U.S. relies far more heavily on income taxes than any other major nation. In fiscal 1953, only 14 per cent of federal tax receipts came from excises, while nearly all of the remainder was produced by taxes on corporate and individual income. Great Britain, on the other hand, obtained 33 per cent of her revenues from excises in fiscal 1953. France and Western Germany obtained 54 and 64 per cent respectively. Formerly the U.S. relied less on income taxes and more on excises than she does today.

The failure to take advantage of ma-

Checked for accuracy by ATOMIC LIGHT



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jor revenue sources places greater pressure on other sources. If you depress a toy balloon with your finger-tip, pressure on all points increases. This is the problem that faces the new Congress.

PITTSBURGH . . . A general increase in both orders and shipments along with completion of a nine-year plant improvement program have given Allegheny Ludlum Steel Corporation a brighter outlook for the fourth quarter, E. J. Hanley, company president, recently stated.

"Our dollar volume should be higher in the fourth quarter than in the third," he said, "and, with completion of all major installations in our improvement program, installation expenses will decline and production will be lower."

Sales and revenues for the third quarter of 1954 totalled $38.6 million and resulted in net earnings of $546,886, equal to 27 cents per share of common stock after provision for preferred stock dividends.

CHICAGO . . . Flood-induced power shortages caused about a 50 per cent stoppage in metalworking plants in the Chicago area for about one work week of October. The city reported the heaviest rainfall in 69 years.

DETROIT . . . Ford Motor Co. plans to bring back the Continental—the elite of its luxury automobile lines. The Continental, which will be re-introduced in 1955, is a continuation of the old Lincoln-Continental, first built in 1940, but discontinued in 1948. The new Continental Division—formerly Ford's Special Products Division—will design, engineer, manufacture and distribute the car under the direction of the youngest Ford brother, William Clay.

Small Business

LOS ANGELES . . . Aircraft Parts Manufacturers' Association is urging the Air Force to award 25 cents of every contract dollar to small manufacturers, claiming about 12 per cent of the west coast's 4,000 small airframe and aircraft component makers are forced to seek other fields—a situation that could "precipitate a dried-up source condition" if major companies again have to make an all-out production effort.

Index of new orders and shipments of machine tools

source: National Machine Tool Builders Association

Month	Domestic	Foreign	Shipments	Ratio Unfilled Orders to Demonstrated Production Rate
May	246.4	14.7	356.0	7.7 - 1
June	273.4	16.6	342.2	7.4 - 1
July	247.3	18.6	267.6	7.4 - 1
August	286.9	17.6	299.6	7.3 - 1
September	223.7	16.5	328.3	7.0 - 1
October	198.7	21.7	384.4	6.6 - 1
November	146.6	16.9	320.2	6.1 - 1
December	149.8	21.9	301.4	5.8 - 1
January	173.5	19.1	319.4	5.6 - 1
February	159.8	14.4	323.1	5.1 - 1
March	169.6	24.9	327.2	4.6 - 1
April	142.8	15.9	302.7	4.1 - 1
May	139.5	11.9	270.3	3.8 - 1
June	185.2	15.5	276.3	3.6 - 1
July	124.7	14.8	205.7	3.4 - 1
August	147.9	16.2	203.7	3.2 - 1
September	p. 179.8	p. 11.8	p. 213.6	p. 3.2 - 1

CHICAGO . . . Inland Steel Co. reports a most successful year to date, and is looking ahead to an even bigger future. President Joseph L. Block says, "There will be a tremendous growth in demand for flat rolled products. The country will require more and more markets in the automobile, TV, applisheet and strip to care for expanding ance and other consumer fields. That is where the market lies." Inland estimates that tin plate also offers an evergrowing market, for cans and other containers, and now in the soft drink field. The company attributes its successful history to three fundamental factors: (1) long-range strategy; (2) customer service; (3) advertising directed to the trade, rather than the general public, telling about the kinds of services the company offers.

WASHINGTON . . . Getting the federal government out of competition with business would reduce the national debt and benefit taxpayers, the National Chamber of Commerce advised Congress recently.

The Chamber endorsed legislation establishing a cabinet-level anti-government competition board to supervise the program of the liquidation of the capital assets of government business and commercial-type activities.

The Chamber proposed that the Budget Bureau carry out detailed steps of the program under a Presidential order requiring each of the executive departments to set up a program of examination and inventory of each of its commercial and industrial-type facilities. Programs would be reviewed by the Budget Bureau and analyses sent to the Board for decision as to continuance or discontinuance of each such facility.

The Budget Bureau also would establish a yardstick for guidance of the executive departments as to what constitutes a commercial or industrial type facility, advise the departments on administration policies, and set up a tentative work schedule to be followed by the departments.

The lure of high price supports outweighed Federal restrictions aimed at eliminating seven per cent of cropland from production in 1954. Farmers ignored acreage cuts of 12 per cent for corn and planted about as much as in 1953. Tight acreage restrictions on wheat and cotton turned farmers to production of record amounts of other crops—oats, barley, rice, soybeans, etc.

WASHINGTON . . . Manufacturers' agents can provide effective and economical marketing for many small business concerns, according to a leaflet written for the Small Business Administration.

It explains that "a manufacturers' agent sells your product along with those of other manufacturers whose products are noncompetitive with yours. Typically, the agent solicits orders for you on a commission basis, leaving you to ship and bill the purchaser directly."

"I see there's a lot in how a person turns the knobs!"

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Vacuum Metallizing . . . New Low-Cost Method of Finishing Metal Products

By **J. Gordon Seiter,** Manager
Vacuum Metallizing Div.
F. J. Stokes Machine Company
Philadelphia, Pa.

VACUUM coating has long been considered a "laboratory baby," and not a practical industrial production process. However, since the development of efficient, high speed oil diffusion pumps for providing the necessary vacuum, the techniques have advanced tremendously and the process now enjoys many practical industrial applications.

Vacuum coating techniques were first employed to provide low reflectivity coatings on lenses and instrument covers and thus found widespread applications during World War II. The pilot of a plane, for instance, would often see clouds and sky reflected in the glass covers of his instruments. It was found that a thin film of magnesium fluoride evaporated on the surface and permitted full visibility of the instrument dials. It was also found that aluminum, evaporated onto glass, provided first surface mirrors having exceptional reflective qualities. From these "scientific" applications the basic industrial process of vacuum metallizing was born.

Perhaps one of the most familiar items produced by this process is the automobile horn button or medallion. These pieces are molded of clear acrylic

Just about everything from automobile trim to zithers, from aluminum die casting to zinc, can be finished today by vacuum metallizing.

Brilliance without buffing or polishing sums up the main advantage of this process which costs about one-third that of electroplating. Durability of the finish on exposed surfaces for exceeding that of commercial chrome plating is possible with new baked synthetic lacquers. Production-scale operations on a virtually continuous basis can be achieved with comparatively unskilled labor. Newer designs of vacuum metallizing units have push-button control and pre-set cycles of operation.

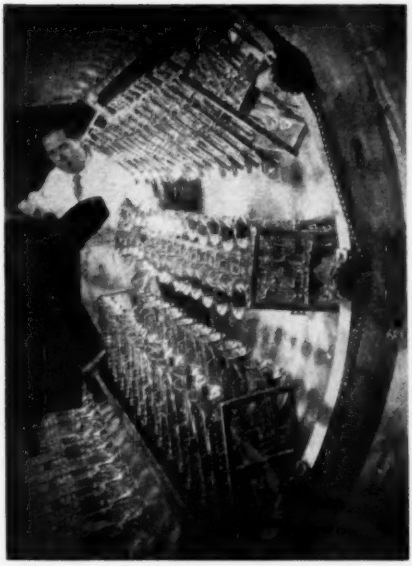
A wide variety of products are bright-finished inexpensively by Vacuum Plating & Metallizing Corp., Philadelphia, Pa. in a Stokes 48-in. vacuum metallizing unit. Items range from door pulls, escutcheon plates, electric outlet cover plates, and other hardware to drum-majors' batons; from vases, bowls, and bicycle horns to mail boxes, lampshades, and appliance nameplates.

plastic and are metallized on the rear or underneath surface so that the effect, when viewed from the front, is one of a three-dimensional metallic insert. Many novel and decorative effects can be obtained by this method. For example, a multi-colored metallized appearance can be given, by spraying on translucent lacquers of several different colors prior to metallizing. These colors can be confined to certain limited areas by using metal masks during the spraying operation. The familiar Ford emblem, for instance, requires five separate masking-and-spraying operations before the piece is finally metallized. Each of the colors—black, red, blue, silver, and gold—must be sprayed on individually and allowed to dry before the next color can be applied. Once the piece is fully lacquered, it is vacuum metallized with aluminum, also on the reverse side, and the aluminum deposits give the multi-colored lacquered surfaces the strikingly effective metallic appearance which was desired. Where no colored lacquer was applied, of course, the aluminum appears as a chromium insert.

Fundamentals of Vacuum Metallizing

Basically, the vacuum metallizing process is extremely simple. The parts to be coated are mounted on suitable racks and placed in a vacuum chamber. Perhaps the most popular size unit on the market today measures 48" in diameter by 60" long. However, the tendency is toward larger vacuum chambers. The largest standard chambers that are available measure 72" in diameter by 60" long.

All of these units have large capacity vacuum pumping systems and it is possible to evacuate these large chambers when clean, dry, and empty, to less than 1 millionth of an atmosphere in about 7 minutes. After the pieces to be coated are placed in the chamber and a pressure of ½ micron is obtained, the coating metal (usually aluminum) is melted and vaporized by a resistance heating element mounted coaxially along the center of the horizontal chamber. As the aluminum melts and vaporizes, the molecules take flight and travel through the vacuum at high speed and condense on the surface exposed to the vapor source. Characteristically, these molecules travel only in straight lines. If a flat sheet of glass were placed in the chamber with one side facing the vapor source, the side opposite the vapor source would not be coated unless the glass was rotated during the time the metal was evaporating. This "one side coating" method is usualy employed to metallize the



300 toy trumpets at a time are given an appealing bright real-metal appearance by metallizing in a 72-in. vacuum metallizing unit at Ideal Toy Corp., Hollis, N.Y. Virtually continuous production round the clock in 15 minute cycles is achieved by loading the next rack while the first batch is being processed.

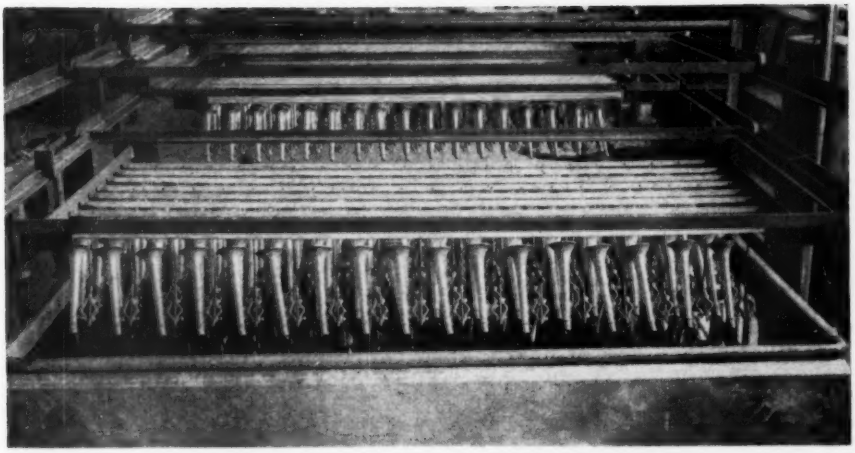
Which would you choose if you were a child—or buying one for your child? The answer's obvious: the realistic, shiny brass-colored vacuum-metallized saxophone at the right, which is Harmonic Reed Corporation's improvement over its earlier colored-plastic saxophone at the left. High impact polystyrene is the base material.

familiar automobile horn buttons and medallions referred to above.

When it is necessary to coat all sides of the object, the piece or pieces must be rotated within the vacuum chamber similar to a chicken on a barbecue spit. In this way, all surfaces are exposed to the vapor source and will become completely coated. One of the interesting points concerning the evaporation of aluminum is the method by which the aluminum can be made to coat the entire interior surface of the vacuum chamber. Mounted coaxially, and extending through the center of the horizontal chamber, is a set of electrodes to which are attached several "filament holders." These filament holders are all mounted in parallel on the electrodes and provide a unique method for obtaining the heat necessary to melt the aluminum. The usual filaments are stranded tungsten wire—similar to the wire used in the familiar incandescent lamps. The tendency today is toward the use of heavier filaments in order to obtain a longer life from them. A popular size of stranded tungsten filaments consists of three .030" diameter wires braided together and coiled so that approximately five coils will be formed with a pitch of about ½" between coils. These tungsten filaments are mounted on the filament holders, and a half-inch staple of .060" diameter aluminum wire (2S-O is generally used) is placed on each coil. When the appropriate vacuum has been obtained in the chamber, low voltage current is applied to the two electrodes and all of the filaments within the chamber become incandescent. It is much like looking into the interior of a huge incandescent lamp in that all of the filaments are brightly glowing with equal intensity just prior to the evaporation of the aluminum.

Aluminum has the peculiar property that, when melted, it has an affinity for the tungsten wire. Therefore, as soon as the aluminum staples melt, the aluminum runs along the stranded tungsten wire and actually "wets" the filament. Upon further increasing the temperature of the tungsten filament, the aluminum will evaporate and the aluminum molecules will radiate from the tungsten filament in all directions and deposit on all exposed surfaces by condensation. The temperature of the filament at the evaporation point of aluminum is approximately 1800°F.

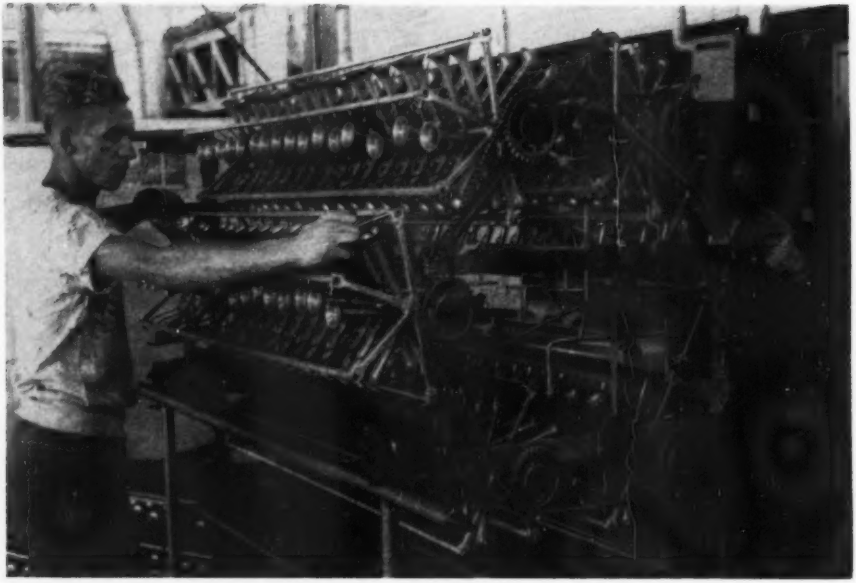
Unfortunately, aluminum and a few aluminum alloys are the only metals which will wet a tungsten filament properly. If you were to use a gold, copper, or silver staple instead of aluminum, the staple would melt in half and drop to the bottom of the chamber without wetting the tungsten filament or evaporating sufficiently to coat the ob-



At Yoder Mfg. Co., Little Rock, Ark., die-cast zinc bicycle horns are loaded on specially designed fixtures after degreasing and given a smooth slick undercoat of lacquer by this ingenious conveyorized set-up. The tank is raised by a hydraulic jack until the lacquer completely covers the horns, then lowered very slowly so that the lacquer coating is free of runs. Since the metallized finish exactly duplicates the smoothness of the undercoat, the technique contributes greatly to the quality of the finish of the final product.

jects within the chamber. This presents a rather serious problem in that it is often desirable to use a metal other than aluminum. In printed circuitry, for instance, it is desirable to evaporate a thin film of copper on a phenolic sheet and then, by electroplating, build up a desired thickness of approximately .015". Since it is very difficult to electroplate on aluminum, copper is generally used as the base metal. However, as mentioned above, copper cannot be evaporated by the conventional filament method. In order to evaporate copper, it is necessary to form a "V" shaped trough from .005" molybdenum sheet and, by crimping the ends together and fastening them between the electrodes or filament holders in the chamber, current can be passed through the molybdenum sheet and make the "boat" incandescent. In this way, small pellets of pure copper, gold, or silver can be placed within and evaporated from the molybdenum trough. These boats usually measure about 4" or 5" long by approximately ¼" to ⅜" deep.

This method, however, has one serious drawback. As mentioned previously, the molecules travel only in a straight line from the vapor source. Therefore, when a molybdenum boat is used, the metal will vaporize only in an upward direction. Therefore, objects mounted beneath the boat will not be coated. In order to accomplish the coating of all objects mounted within the chamber and to utilize every available bit of space within the chamber, it is necessary to mount the parts on rotating fixtures and then, by a planetary gear system, revolve all of the fixtures with-



After lacquering, Yoder's bicycle horns are wheeled into an oven where the lacquer is baked for 35 minutes. The lacquer coating closes the pores of the zinc die-casting and prevents outgassing, thus speeding up the pump-down of the vacuum chamber and shortening the production cycle. After baking, the horns are loaded (as shown here) into the "spiders" of a 48-in. vacuum metallizing unit. The chain drive rotates these spiders during the flashing period so that all parts of the horns are brought into the line of fire and coated with their full share of the vaporized metal. The coiled tungsten filaments on which the aluminum staples are hung can be seen in the center of the rack, running along the longitudinal axis of the metallizer.

in the chamber so that each set of racks will eventually come above the vapor source and rotate there.

Actually, the vaporization of the aluminum during the normal vacuum metallizing process takes about 10 or 15 seconds. Most of the time cycle is utilized in obtaining the proper vacuum in the chamber so that the flight of the metal vapors from the molten source will not be impeded by the few remaining air molecules.

The vacuum metallizing process is not considered practical for building up heavy deposits of metals. For instance, in the normal evaporation of aluminum, (10—15 seconds) the film has been measured and found to be in the order of 5 millionths of an inch thick. This is an extremely thin film, and naturally, it will exactly reproduce the surface on which it is deposited. Therefore, in order to obtain a highly polished piece simulating a buffed chrome piece, it is necessary that the surface on which the metal is deposited be extremely

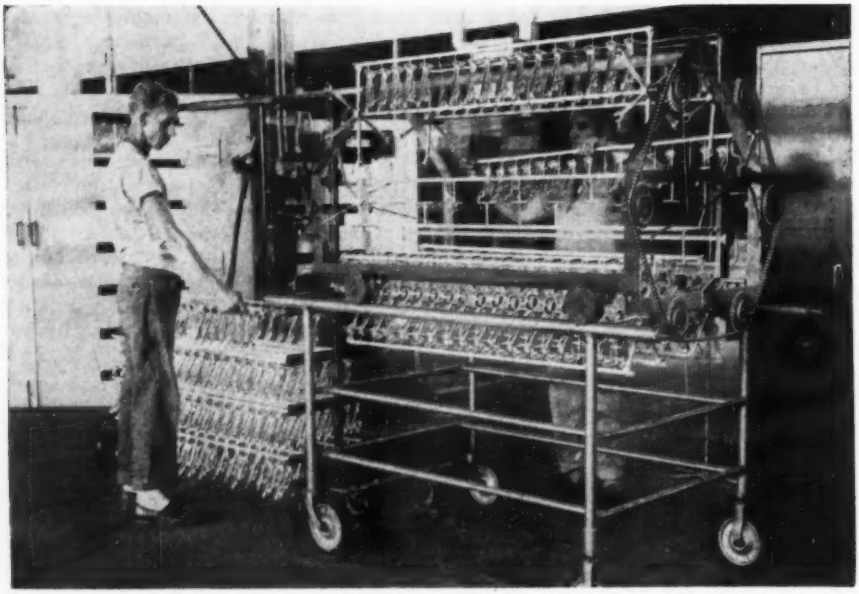
smooth and glossy. It is here that the vacuum metallizing process gains such a tremendous cost advantage over electroplating. No buffing or polishing operations are required in order to achieve the glossy surface necessary prior to the evaporation process. Instead, it has been found that a very suitable glossy surface can be obtained by depositing a coating of lacquer or synthetic resin on the objects to be coated prior to metallizing. On zinc die castings and steel stampings, for instance, it is merely necessary to clean the pieces by the conventional methods and then rapidly a coating of lacquer, either by dipping or spraying. An oven bake is usually required in order to make a hard, glossy surface to receive the evaporated metal.

The coatings of lacquer contain enough solids to fill in minor scratches and defects in the die castings or stampings. It is usually merely necessary to remove the "flash" from a zinc die casting and then apply the base coating of lacquer prior to metallizing in order to obtain a highly polished piece simulating a buffed chrome plated surface.

The cleaned castings or stampings are usually mounted on the racks and go through the entire metallizing process before they are finally unracked and packed ready for shipping. They can be lacquered right on the racks by dipping or spraying according to the choice of the manufacturer. Electrostatic spraying is sometimes used if the shape of the piece lends itself to this particular method. Other operators prefer to use hand spraying which does require a certain technique and skill before a good, smooth coating of lacquer without runs or orange peel can be obtained. The jewelry industry, for instance, takes the slush metal die castings which are usually made in rubber molds and sprays them with lacquer, bakes them for approximately 30 minutes at 300°F. and then sprays a second coat of lacquer on top of the first in order to obtain an extremely high gloss finish. When these parts are finally metallized and coated with a protective top coating of lacquer, they have the rich deep tone of a highly polished piece of platinum jewelry. Since the cost of the aluminum and tungsten wire amounts to about 75c per vacuum chamber load, and since the custom metallizer can mount approximately 3500 pieces of jewelry in a 48" chamber at one time, it is easy to determine that the majority of the cost centers around the labor required for the racking and lacquering operations.

After the pieces have been lacquered, baked, and metallized, it is necessary to apply a top coating of lacquer in order to provide a protective film over the very thin aluminum coating. Otherwise with frequent handling, the 5 millionths of an inch of aluminum would soon wear off. This clear coating of lacquer or synthetic resin, which is applied as a protective covering, provides the piece with the final appearance of a highly polished chromium plate. However, if it is desirable to have a gold, brass, copper or other metallic effect, the final piece may be dipped in a dye which will color the clear top coating, thus simulating any metallic effect that may be required. If the contour of the piece is a very smooth one, it is sometimes possible to incorporate the desired color in the top coating of lacquer in order to avoid the dyeing operation. However, if there are any recesses in the surface of the diecastings or stampings, heavier deposits of colored lacquer in these areas will cause a difference in color. Easier control of uniform coloring can be achieved by the dip-dyeing operation, and this method is generally employed.

Now that we have a basic concept of the vacuum metallizing process, we have learned that the required equipment includes the vacuum metallizing unit and pumping system, the racks, jigs, and fixtures for holding the pieces



After metallizing, the rack is pulled from the vacuum chamber of the metallizing unit. The metal-coated horns are then given a protective topcoat of lacquer which, like the first coat, is baked for 35 minutes. The hard, tough coating thus produced protects the brilliant and lustrous metallic finish, which can then resist more than 250 hours of salt spray without visible deterioration.

to be plated, lacquering equipment (either dipping or spraying), baking ovens in order to properly cure the lacquers prior to and after metallizing, and several sets of trucks, racks, jigs, etc., in order to accommodate all parts of the work to achieve a smooth flow of operation. A complete vacuum metallizing setup for the popular 48" diameter units will cost between $35,000 to $50,000 depending on the complexity of the lacquering equipment and baking ovens that may be required. Approximately 3,000 square feet of floor space is required for efficient operation although some plants have installed metallizing units within 2,000 square feet and operate satisfactorily. 4,000 square feet is an ideal arrangement for the 48" metallizer.

Advantages of Vacuum Metallizing

It is very easy to sum up the basic advantages of the vacuum metallizing process. First of all, it is a low-cost plating process since no hand buffing or polishing operations are involved. Once the pieces are racked, they are not touched until they are finally completed and are packed ready for shipment. Secondly, the racking operations do not require any skilled labor, and neither does the operation of the metallizing unit itself. The actual evaporation of the metal is very simple and can easily be controlled by predetermined

specifications in order to achieve perfect results every time. A person of average intelligence can learn to successfully operate a vacuum metallizing unit within a day or two in order to obtain brilliant aluminum coatings.

The lacquering operation is the most serious one in the entire process and is one requiring the greatest degree of skill. If hand spray guns are used, the lacquering man must be an expert in order to achieve quality coatings. The automatic spraying machines eliminate much of the skill required for the application of the lacquer coatings, but these are considerably more expensive than the standard spraying equipment and require an expert to set them up. Many custom metallizers are using a cheaper dip, spin, and slow rotation method and are producing quality work. With this latter method, operators can be trained to successfully lacquer the pieces within a relatively short period of time.

Another basic advantage of the vacuum metallizing process is the fact that it is easy to maintain excellent quality control. If the lacquers are clean and subjected to a continuous filtering process, and the viscosity is maintained within reasonable limits, quality metallizing will result. The success of the entire process depends upon the skill of the lacquer applicators in order to achieve the necessary gloss coatings.

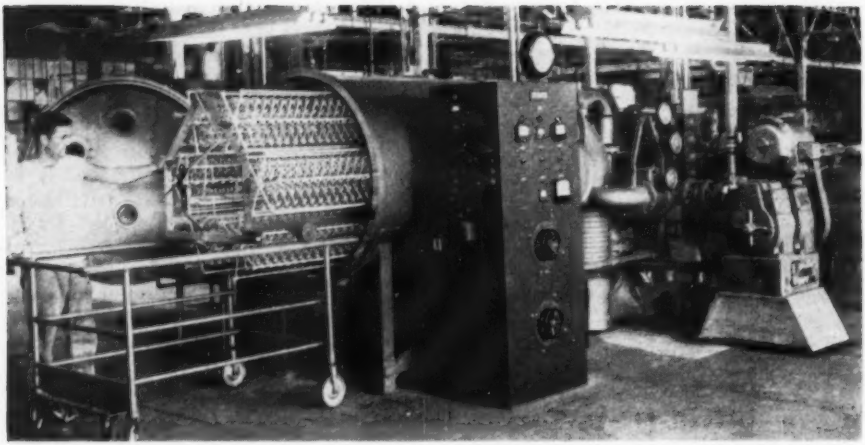
Limitations

There are certain limitations to the vacuum metallizing process. First of all, it is not considered practical to attempt to build up a heavy deposit of metal. Aluminum evaporates very slowly and heavy layers of metal are not achieved by this method. Some metals, such as tin, cadmium, and zinc evaporate rather rapidly, and it is possible to build up a thickness of one to three thousandths of an inch in about 10 minutes. This is considered extremely fast for the vacuum metallizing process. Chromium is very difficult to evaporate. It does not provide a bright metallic coating when evaporated, and therefore, it is not generally used. Due to the fact that the film is so very thin, it cannot be considered for use where it will be subjected to excessive abrasion. It is not possible to use vacuum metallizing as a method for building up hard chrome or other wear-resistant surfaces. The success of the vacuum metallizing process depends entirely upon the lacquer coatings which are used to protect the thin metallic film. Fortunately, the lacquer companies have recognized the tremendous potential in the metallizing process and have developed synthetic resins which have remarkable wearing qualities.

Another basic disadvantage of the metallizing process is the fact that it is not possible to obtain "color buffing." It is possible to obtain a satin finish merely by buffing the piece prior to evaporating the film of aluminum, but generally speaking, the process is used where it is desirable to obtain a highly polished and glossy finish. As mentioned previously, lacquering presents the biggest problem throughout the entire vacuum metallizing process. Runs, dust particles, orange peel, blushing, etc., are all problems common to the application of a smooth coating of lacquer. However, spraying and dipping techniques have been developed to such a point that control standards can be established and quality work can be produced with a minimum number of rejections.

Recent Developments

Due to the tremendous potential in this low-cost plating process, several lacquer companies have engaged in extensive research programs in order to develop the necessary synthetic resins for the die casting and steel stamping plating industry. In fact, the lacquers



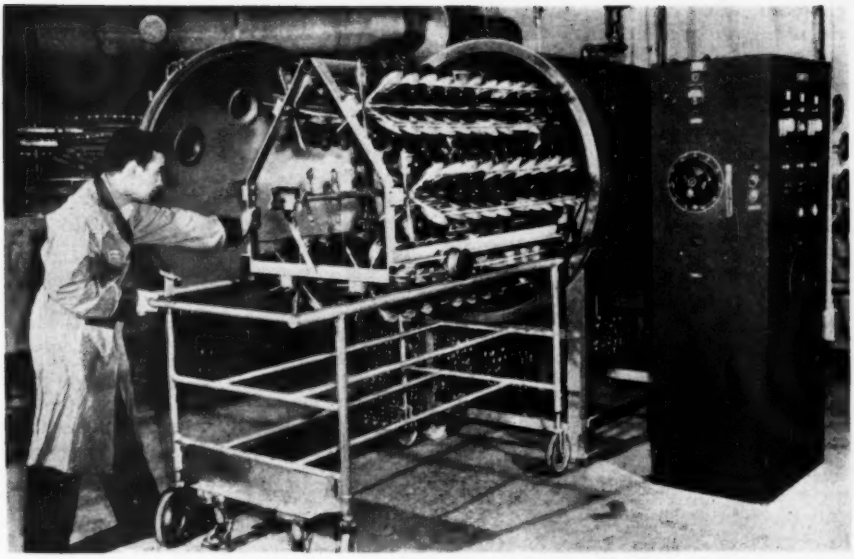
The compact layout of the 48-in. vacuum metallizing unit requires only 200 sq. feet of floor space.

that are presently used for vacuum metallizing have been found to have tremendous resistance to salt spray, humidity, and abrasion. Vacuum metallized die castings, for instance, have withstood as high as 500 hours of salt spray and 800 hours of humidity, and the latest achievement is a better wearing quality than standard copper-chrome plating which is used throughout the automotive industry. The automotive industry has recently completed a series of tests whereby they have determined that a standard Taber abraser, with No. CS10 wheel and a 500 gram weight, will wear through copper-chrome plating before it will wear through a vacuum metallized film that has been properly protected with the new synthetic resins. This is a significant fact and opens tremendous new potentials for the vacuum metallizing industry. Color fast dyes have also been developed which will simulate brass, gold, copper, etc., and are very difficult to tell from highly polished brass or copper plating.

New Applications for Metallizing

Almost everyone is familiar with many of the "old" applications where the vacuum metallizing process has been successfully employed. Plastic toys, for instance, are a big consumer of the vacuum metallizing capacity in the country today. Costume jewelry—both slush metals, die castings, and plastic molded pieces—are popular vacuum metallized items. The above mentioned automobile horn buttons and medallions also take a considerable volume of the custom metallizing capacity that is available today.

However, since the development of the newer and tougher protective lacquers, vacuum metallizing will soon find widespread use in the manufacture of automotive and domestic hardware. Such items as dome lights, interior trim, handles and knobs, exterior trim such as rims around tail lights, head lights, and decorative trim, etc., are all on the verge of being plated by the vacuum metallizing process. It is not considered



Packard parking lamp reflectors—720 to a load—are given a highly reflective surface in a matter of minutes in a 48-in. vacuum metallizing unit at Detroit Plastics Moulding Co., St. Clair Shore, Michigan, a leading metal finisher.

beyond the realm of possibility that even bumpers will someday be vacuum metallized as soon as a tough lacquer can be developed which will resist impact.

Domestic hardware, such as drawer pulls, knobs, radio and TV trim, etc., are common items employing the vacuum metallizing process today. Many new applications are being discovered every day and the potential in this particular field is considered tremendous. The lamp industry, for instance, produces highly polished simulated brass and chrome plated parts. These parts can be vacuum metallized for a fraction of the cost of the electroplated pieces formerly in demand. Household appliances are also considered high on the list of potential vacuum metallizing applications. Vacuum cleaner parts are being successfully vacuum metallized today due to the development of the synthetic resins for protective coatings.

The recent vacuum coating developments in the industrial field have created a widespread interest in that many new applications are now being carried out successfully on a production basis and others are in the process of being further developed.

For instance, the manufacture of selenium rectifiers for converting alternating current to direct current is a full-scale industrial application of vacuum coating.

Pure selenium can be evaporated onto nickelplated aluminum sheets to provide a uniform coating approximately .003" thick. This evaporation can be performed in a rather unique manner by mounting the aluminum sheets around the inside periphery of a slowly rotating drum within the vacuum

chamber. Due to the nature of the selenium, it is necessary to employ "boats" or crucibles to hold the molten metal during evaporation. This vapor source is usually mounted coaxially within the chamber within the rotating drum approximately 8" beneath the surface of the plates to be coated. This also permits a second boat to be located beneath the rotating drum so that a second set of plates can be mounted on the outside periphery of the drum and thus the two sets can be coated simultaneously—being mounted back-to-back.

The construction of a selenium rectifier plate consists of the base plate, usually aluminum, on which is deposited a layer of selenium, a barrier film and a counter-electrode. The base plate is first electroplated with nickel and then the selenium is deposited on one side — either by a "hot-press" method or — more conveniently, by vacuum metallizing.

On the top of selenium must be deposited a barrier layer for the purpose of stabilization. This barrier layer actually provides a barrier against reverse currents and permits the current to flow in one direction only. This eliminates the lower half of the sine wave of alternating current and, by properly stacking the selenium plates, a true DC output is achieved. The barrier film can also be applied by vacuum coating. The same drum arrangement is used in this step of the process but a separate vacuum chamber is usually employed. Selenium is expensive and it is possible to reclaim the metal that has condensed on the sides of the chamber. If other materials are evaporated in the same chamber, they would contaminate the selenium and make recovery of the pure metal more difficult.

The third layer to be deposited on the base plate is the counter-electrode. This is usually an alloy consisting of cadmium and zinc or cadmium and bismuth or other suitable low melting components

While the selenium and barriaer layers are deposited over the entire surface of one side of the plate, the counter-electrode is masked so that the edges of the plate and a small border around a center hole (if so designed) are not coated with alloy. This permits an electrical connection to the selenium as one electrode and a connection to the counter-electrode as the second electrode. With plates having a hole in the center, several plates may be stacked on a common shaft and the selenium layers are thus connected in parallel.

It is common practice to apply the counter-electrode by spraying the alloy with a common metal spray gun which melts the alloy upon emission from the gun. However, experiments have been conducted whereby it has been found possible to apply the counter-electrode as an alloy by vacuum coating. Some alloys can be successfully evaporated while others cannot. If the boiling points of the elements of the alloy are too widely separated, distillation will take place and a corresponding alloy will not result on the coated surface. However, an additional application for vacuum coating is "made-to-order" in this case, since the alloys generally used for counter-electrodes on selenium rectifiers can be successfully evaporated as the true alloys.

Another recent development in vacuum coating is the application of a conductive film on a non-conductive surface in order to provide a base for subsequent electroplating. As mentioned previously, it is not considered practical to attempt to build up a heavy deposit of most metals by the vaccum metallizing process. In many instances, it is necessary to have a deposit as heavy as .015" of metal in order to provide proper current-carrying characteristics or wearing qualities. These heavier deposits can be very conveniently accomplished by first depositing a conducting film of copper on the surface of the non-conductor by vacuum metallizing

5410

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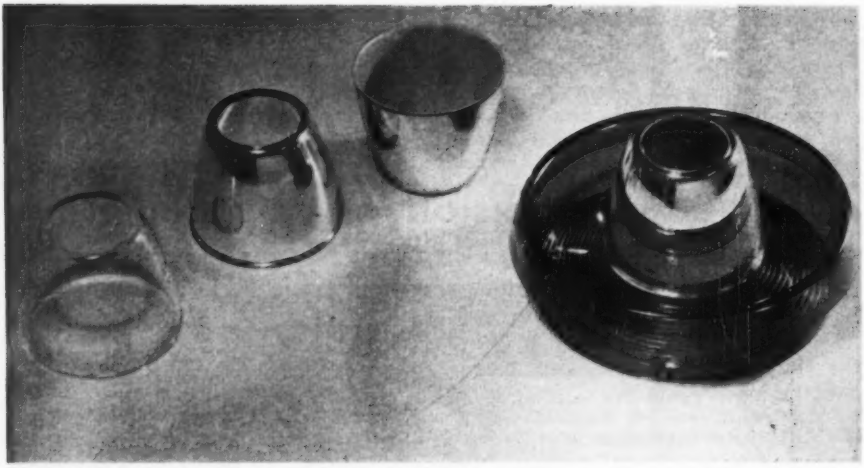

Ford taillight reflector is metallized on the under surface in a 48-in. vacuum metallizer at Detroit Plastics Molding Co. The bright finish is protected by the clear acrylic plastic. This procedure is termed "second surface coating." Same method is also used for the Ford emblem.

and then, by a subsequent electroplating, build up this film to the desired thickness. Such applications as printed circuits on phenolic boards and plating of vinyl mats for the printing industry are excellently accomplished by vacuum metallizing.

In connection with the buildup of an electroplated surface on an evaporated film, one of the problems in the past has been achieving the proper adhesion between the metallized film and the non-conducting surface after the electroplating process. The adhesion is usually tested by cutting a 1" wide strip and peeling a portion of the metallized strip from the base board. The base board is then mounted horizontally with the peeled portion of the strip extending downward at 90° to the board. Weights in gradually increasing amount are then attached to the projecting end of the strip and when the adhering portion begins to peel away from the board, the bond has reached the limit of its adhesive characteristics. In some instances, the weights are applied to the strip while the board is mounted vertically so that the pull is exerted at 180° against itself rather than at 90°.

The above-described tests are rather severe depending on the amount of pull which must be resisted. Some specifications, such as that for copper-coated phenolic boards used for printed circuitry,, call for the bond to withstand a 5-lb. weight at 180°. Interest in printed circuits has been greatly stimulated by the recent developments that have made it possible to obtain the required adhesion.

Adhesion of an evaporated film (This procedure relates only to vacuum-metallized surfaces which are for printed circuitry or for suxsequent electroplating. Not required otherwise.) is a function of the cleanliness of the surface on which it is deposited. Normal cleaning operations, augmented by the use of heat and a high-voltage clean-up, will usually provide a surface sufficiently free of absorbed gases and moisture to insure proper adhesion of

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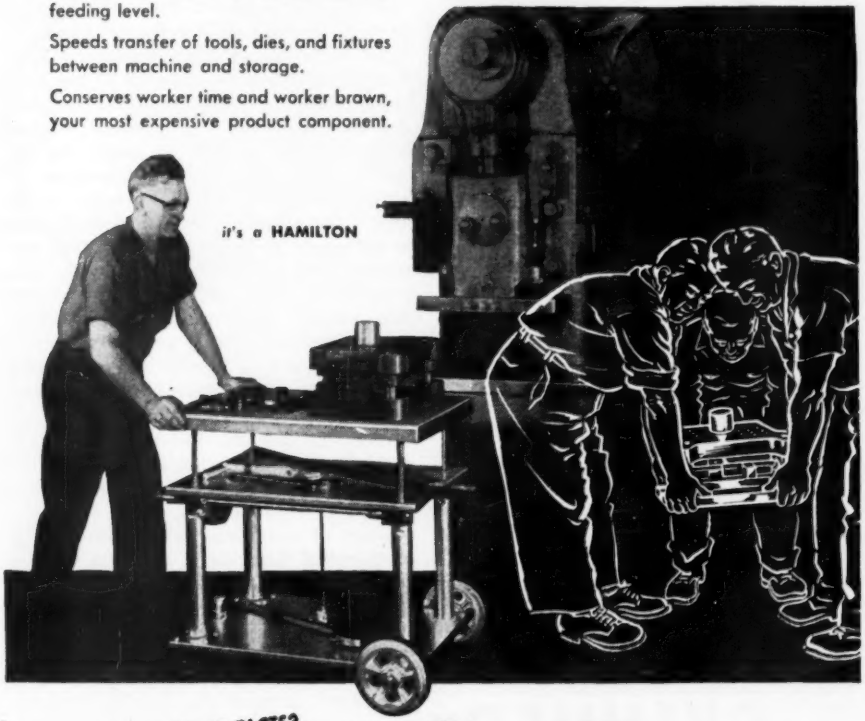

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the evaporated film. The high-voltage clean-up involves the use of an electrode extending into the vacuum chamber to which a power of approximately 2500 volts at 200 miliamperes is applied. The chamber is connected to ground. The high-voltage discharge ionizes the residual gas in the chamber and bombards the surfaces of the chamber and all parts mounted therein. This electron bombardment releases the last traces of absorbed gasees and moisture from the surface of the parts being coated so that a more positive molecular adhesion will result when the evaporated metal condenses on the surface.

Just a word about the electroplating procedure employed to deposit a heavier layer of metal on the evaporated film: Copper is usually employed as the base metal which is evaporated onto the non-conducting surface. A common copper sulphate plating bath is used, slightly on the acid side, at a temperature of about 100°F. A current density of 50 amps. per square foot and 6 to 8 volts is sufficient to begin the electrical deposition of additional copper on the evaporated film surface. This current density may be increased as the thickness of the film builds up but care must be taken not to speed the rate of deposit to the extent that burned-out areas and uneven coatings will occur.

Another caution that must be exercised is the elimination of the so-called "back-flashing" operation usually employed to remove any oxide from the surface of the piece being plated. The evaporated film on a non-conducting surface is so thin that 1 second of a reversed current will completely remove the film as well as the oxide and prevent further deposition. To successfully electroplate on an evaporated film, it is necessary to start the plating as soon as possible after the sheet leaves the vacuum chamber. This will eliminate the formation of a layer of copper oxide which would be detrimental to sucessful electroplating.

The End.

5408

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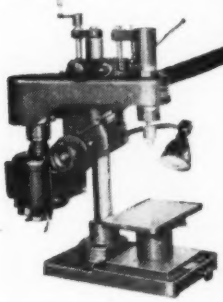

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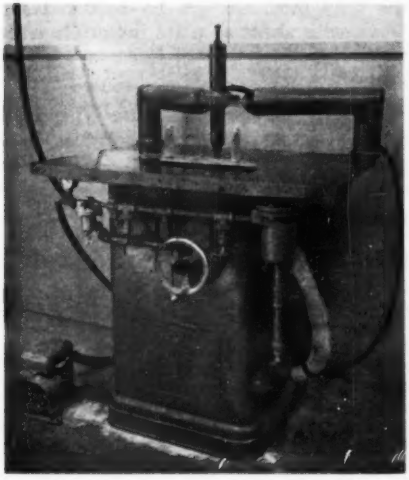
New Template Duplicator

By **Frank Charity**

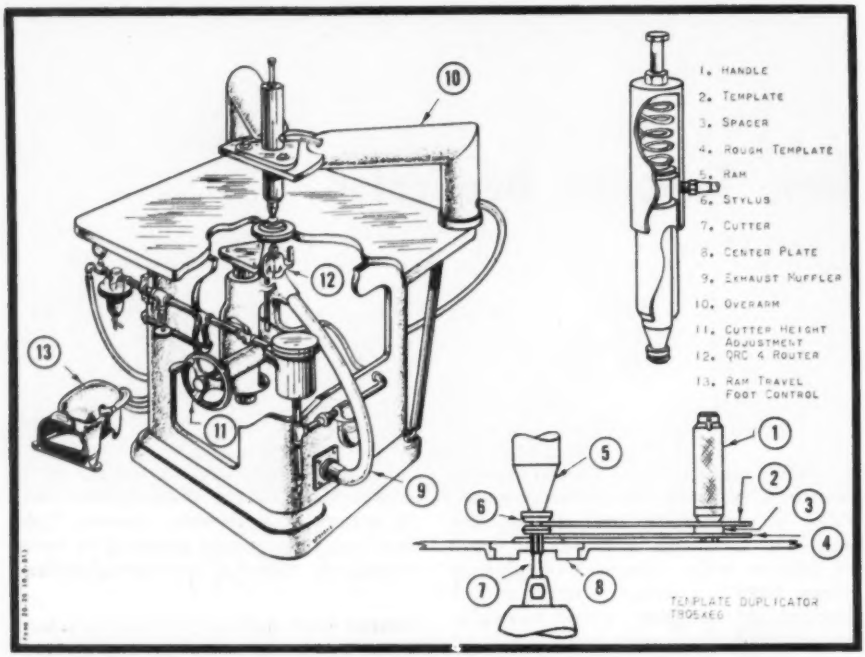
A NEW machine tool developed by Northrop Aircraft, Inc., at Hawthorne, Calif., is now being used to produce duplicate templates and related types of articles with tolerances of plus or minus 0.005" in about a tenth of the amount of time that would normally be required to do such work.

Materials used in making the duplicates are first sawed and trimmed to within 0.020" from their scribe lines by means of a Beverly shearer. Then they are respectively attached to metal masters by means of two special fittings

General view of Northrup Aircraft's new template duplicating machine.



Closeup view showing how handle attachments are used to align a master and rough template with the machine's stylus and cutting tool.



Structural details of the template duplicator.

which vertically and horizontally align and separate the parts for a final trimming operation, and provide a pair of handles which facilitates the manipulation of the temporary assembly.

The spacing of the assembly is such that, when the master is manually pressed against the ¼" guide pin of the tapered-wedge stylus on the new machine tool, the rough template is appropriately aligned with the edge of a carbide cutting tool beneath the stylus. The stylus, in turn, is lowered so as to bring the rough template to a position where it will contact the cutting tool by means of a ram-travel pneumatic foot control.

A QRC4 motor operates the cutting tool with a constant speed of 18,000 r.p.m. during each trimming operation.

By means of a cutter height control, the new machine can be adjusted for work with sheet or plate materials with virtually all of the thicknesses used in aircraft work.

An exhaust muffler of the type used on pin routers minimizes the noise output of the machine.

The End

ASTE western industrial exposition

Floor plans for the American Society of Tool Engineers' first western industrial exposition in Los Angeles next March reveal that 80,000 square feet of actual exhibit space have been made available to manufacturers of tool machines, industrial supplies, processes and equipment in four adjoining exhibit areas of the Los Angeles Shrine Auditorium and Shrine Exposition Hall.

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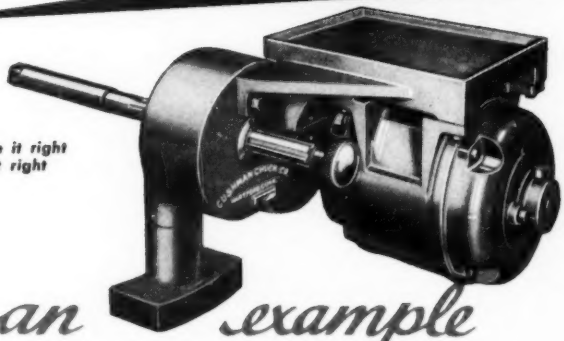

an example

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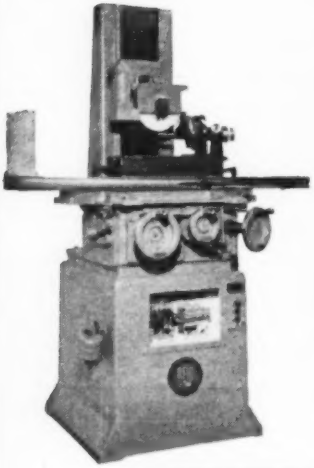

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Multiple Clamps for Jigs and Fixtures

By **Tom Brown**

OTHER names for multiple clamps are single-lever or knob clamps and, as these titles suggest, a single clamping movement can be used to operate several other clamping levers or devices, together with locating plungers and the like.

Multiple clamps are not used so widely in jigs and fixtures as they might be, no doubt owing to the expense of making them and the time which it takes to design effective types. If a piece of work is investigated carefully, however, as to its production possibilities before tools are designed, it would probably be found that multiple clamps could be adopted in some jigs and fixtures with considerable savings in loading and clamping time.

Sometimes, if separate clamps are designed, it is necessary for a machinist to make a journey to the other side of the machine in order to operate them. A great advantage of the multiple clamp is that all the work securing processes can be completed from one central position, usually adjacent to the fixture loading position.

In figure 1 is illustrated a simple two-position drilling jig for drilling four holes in the cast iron elbow joint **A**. The elbow joint is actually part of the exhaust manifold of a diesel engine and requires the drilling of four holes in each end face. Since the drilled ends are at a right angle to one another, the jig can be stood on either of its locating faces **B** for use on a standard vertical drilling machine.

From the drawing, it can be seen that for drilling, the two flat ends of the component must be pushed positively into contact with the undersides of the two drill bush plates **C** and held there while drilling takes place. A single-knob clamp is arranged to do both the operations of locating and clamping.

Main component of the multiple clamp is swinging lever **D** which can pivot about the pin in its end. When released, the lever **D** can be swung clear of the jig interior to allow free passage of the component for loading and unloading. The location and clamping of one end of the elbow is by means of the swivelling pad **E** which has a V-

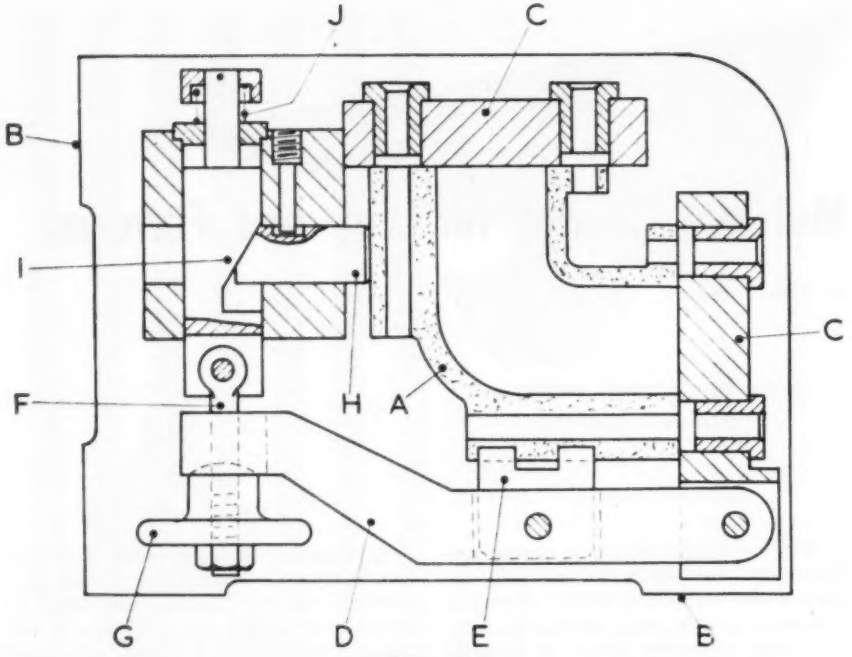

Figure 1

shaped portion for centralizing the rounded boss running down one side of the component. Pressure is applied to the V-piece and thence to the work by the swing-bolt **F** at the other end of the swinging lever.

The swing bolt acts on the lever end through a spherically seating bush which has a large diameter cap **G.** The actual tightening of the swinging lever is by means of the hexagon nut surmounting bush **G.** The enlarged head of the bush is merely there to form a convenient hold for the hand of the jig user when swinging the bolt out of place for loading and unloading.

Positive locating of the second face of the component is by means of the wedge-operated pin **H.** The actual wedge **I** is of cylindrical section and slides axially in a hole machined for it in part of the jig body. It can be seen from the illustration that the swing bolt **F** is anchored to the sliding wedge so that tightening of the clamping nut moves the wedge axially. This movement causes a corresponding motion of pin **H** in a direction at right angles to that of the wedge, pushing the second face of the component into contact with its appropriate drill bush plate.

To unload the jig, the hexagon clamping nut is loosened and the swing bolt moved out of position. This allows the swinging arm to move on its hinge pin clear of the component. The wedge **I** is pulled axially by the compression spring **J** and withdraws its support from the pin **H** which can then fall away from the component.

The jig just described can be moved bodily for loading and unloading, but

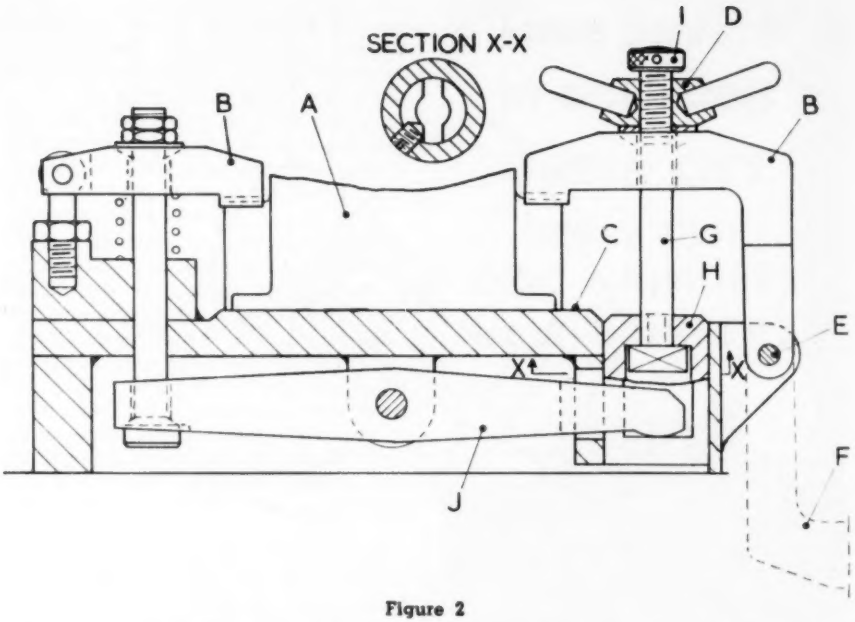

Figure 2

there are heavy fixtures which are designed for accommodating large castings. Such fixtures are bolted firmly to the work tables of large machine tools. It is on such set-ups that it is essential that the clamps be operable from one position—usually at the front of the machine. Such a fixture is illustrated in figure 2.

The component **A** in figure 2 is a cylinder block casting which is mounted in place for surface milling of the top face. The clamping pressure is mainly in a vertical direction and is provided by the two hardened clamp plates **B**. In the actual fixture, the clamping arrangement is duplicated several times along the fixture, as the component is about 2 ft. long.

With the clamping arrangement shown, the cylinder block can be slid from a suitable conveyor onto the fixture platform **C** without the need for any vertical lifting. This requires that the front clamp be movable so that it does not obstruct the sliding of the component during loading and unloading. In addition to being movable, the front clamp automatically operates the clamp at the rear.

Simultaneous operation of the two clamps by operation of single clamping nut **D** is accomplished as follows: The front clamp plate is extended downward at one end and the extension terminates in a hinge pin **E** so that the complete clamp may be swung forward and downward into the dotted position **F**. In order to clear the front of the fixture of all obstructions, the clamp must also take with it the clamping bolt **G**, when it is swung out of the way.

At the lower end of the clamping bolt is machined a T-shaped head, the width between its flatted sides being slightly smaller than the bolt diameter. This bolt head fits into the cylindrical plunger **H** which is bored out hollow for

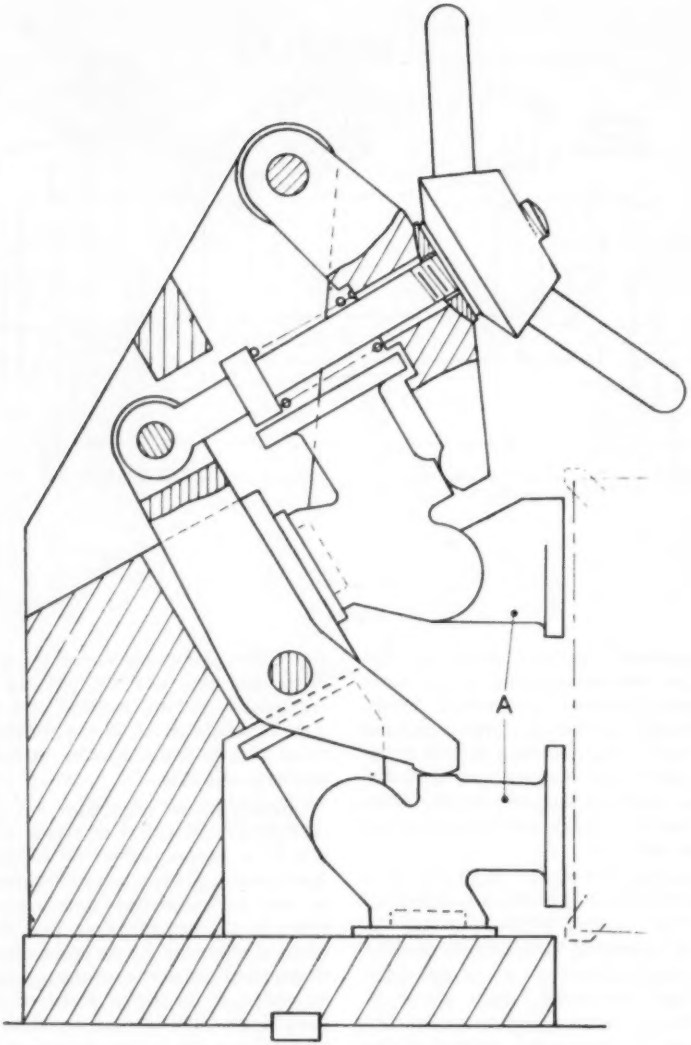

Figure 3

the major portion of its length. Section X-X is a view from the plunger's underside and shows the shape machined in the top end to allow the T-headed bolt to pass through. When the bolt is given one quarter of a turn, it is stopped by the small screwed plug and remains immovable, while the clamping nut D is screwed down. The bolt head bears on the inside face of the plunger end.

When it is desired to release the clamp, the nut **D** is screwed up the clamping bolt until it makes contact with the knurled knob **I** which is pinned to the top of the bolt. This causes the clamping bolt to be given one-quarter of a turn so that its head may be pulled upward out of the plunger **H** enabling it to be swung clear of the fixture, together with its clamp.

When the front clamp is tightened on to the work, it tends to pull upward the plunger **H** through the medium of the clamping bolt. This upward motion is communicated to the rear clamp as follows. A pivoted lever **J** under the fixture has a forked end which engages with a pair of opposed flats machined on the sides of the plunger. Because of the pivot, the rear end of lever **J** moves in a downward direction and its motion is communicated to the rear clamping bolt.

The rear clamp moves upward for a short distance under the action of its compression spring when the clamping pressure is removed. The movement needed to clear it from the work is small because the component is loaded by sliding, as explained earlier. It will be noted that no spanners or other tools are needed for operating this form of multiple clamp. Spherical washers are fitted to communicate pressure to the clamp plates irrespective of tilt. The T-bolt swivel movement is limited to a quarter-turn in each direction so that locking and unlocking of it are automatically obtained through the tightening of the spoked clamping nut. Fumble-free clamping of this nature is very important for high output.

Where a component has two identical machining operations to be performed on it, it is advantageous if the two operations can be completed during a single floor-to-floor cycle. This avoids stacks of components being stored between operations and eliminates one handling operation by the machine operator.

Figure 3 shows the way in which this

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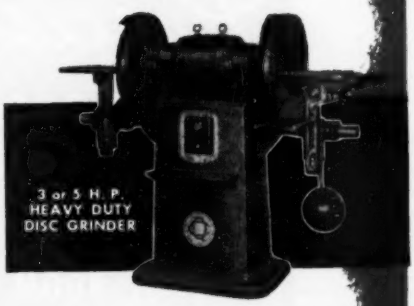

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principle can be adopted, together with multiple clamping. The component A is a manifold casting, one section of which is illustrated. Two groups of four flat faces running along each casting are machined in the fixture shown. A third face has been machined previously. The third face is used as a location for milling both the other groups of faces.

The fixture has two positions for each component and by the use of multiple clamping, two milling operations are completed at each traverse of the machine table. One component is completed during each machining cycle. The top component is removed from the fixture after each cycle and the lower one is moved up into its position. The lower location is filled by a fresh component.

The two pieces are clamped by a

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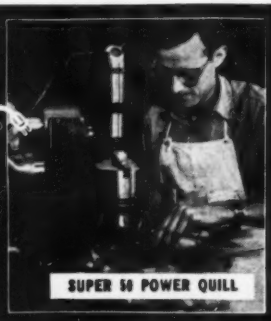

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single operation of the spoked nut and the clamp faces bear on the same portion of the casting during each facing operation. Both clamps are pivoted on hinge pins and the single clamping bolt is arranged to pull both of them toether to clamp the two components at the same time. When the spoked nut is turned so as to relieve the clamp pressure, a compression spring on the bolt lifts the clamping pads clear of the work to allow it to be unloaded. In this fixture it will be noted that clamping and work loading are performed from the one side of it and the movement of the operator is reduced to the minimum thereby.

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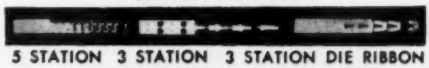

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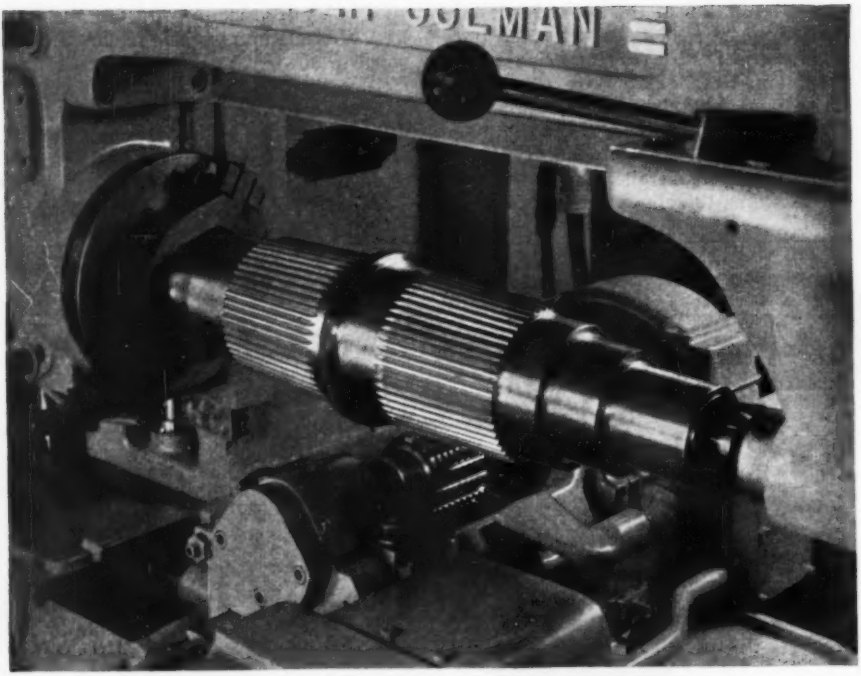

HEAVY TORSIONAL DRIVE USES TAPERED SERRATIONS

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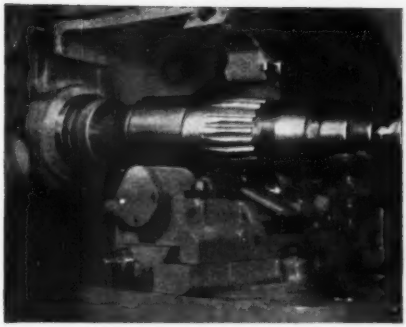
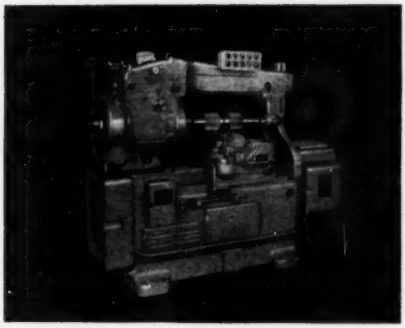
work slide and overarm swivel up to 5°

This Barber-Colman No. 16-16 Hobbing Machine is specially designed and arranged for hobbing tapered serrations. By swivelling the work slide up to 5° to obtain the desired cutting angle, several different tapers may be hobbed on the same machine. Once the proper set-up has been made, hobbing of tapered serrations proceeds according to standard hobbing technique.

Other than the special swivel arrangement on the work slide, universal joint on the worm shaft, and a cut-away outboard overarm support, this machine is of standard design and illustrates the practicability of adapting special work to standard hobbing techniques.

When not in use hobbing tapered serrations, this machine can be used for standard spur or helical gear work and straight splines. It is equipped with an Automatic Hob Shifter for maximum hob life.





metal-to-metal fit, wear compensation

Tapered serrations provide one of the best holding means for drives which have heavy and frequently-reversing torsional loads. The metal-to-metal side bearing fit eliminates relative rotation between members, and the taper provides for take-up to compensate for wear. Typical applications are heavy reversible drives such as tractor axles and hubs, and high-frequency reversible drives such as steering shafts and Pitman arms.

involute tapered serrations

Both involute and straight-sided tapered serrations may be produced by this hobbing method. The major illustration shows the hobbing of 10/20 diametral pitch involute serrations, ¾" taper per foot O.D., 54 teeth, and 6" major diameter. These teeth have a generated form with tapered root and outside diameter, the form changing continuously from the large to the small end. The mating part is swaged slightly undersize and the desired contact is obtained as a result of cold working the material in fitting the members. The swage is usually hobbed by the same set-up as the tapered shaft.

straight-sided tapered serrations

The second illustration shows the hobbing of straight-sided serrations using a single-position hob. These teeth are hobbed in 2-cuts and have straight sides with constant-width tooth spaces which permits the mating part to be broached to size after reaming to the correct taper. The internal mating part is broached one tooth at a time, providing a metal-to-metal fit which is not dependent upon cold working the material. Should looseness occur due to wear, it is taken-up on the tapered sides of the teeth.

Barber-Colman Engineers developed the special single-position hob for producing tapered serrations with a constant space width. They welcome special applications where this type of drive is an advantage and will be glad to furnish estimates on both hobs and machines for economically producing tapered serrations. Just send prints or samples marked for the attention of our Hob Engineers.

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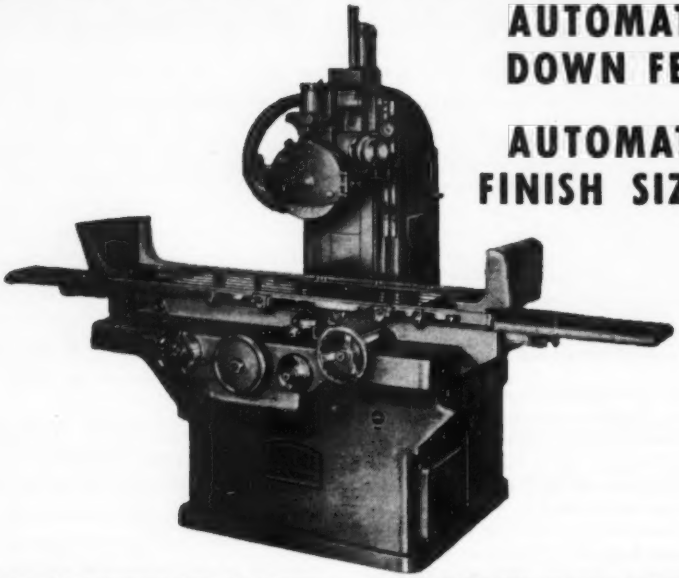

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Time Study . . . part 5

a. Supervisors' Responsibility in Incentive Programs

b. Incentives For Supervisors?

c. Deviations From Standard Work Pattern

d. How To Pay Multiple Machine Operators

By **Harold R. Nissley**
Professional Engineer
Cleveland Heights, Ohio
Cartoons by **Glueckstein**

The Supervisor's Responsibility in An Incentive Program

WHAT ARE the supervisor's responsibilities for a sound incentive program? Many supervisors would like to think they have no responsibility for administering an incentive program. They believe the company has a staff of industrial engineers and wage rate men who are specialists and whose business it is to see that an incentive plan works. They feel their main task is getting out production—almost at any cost.

Then there is an opposite group of supervisors who feel that the company and the local industrial engineers are meddling when they attempt to set work standards or piece rates in their departments. Their attitude may run something like this: "What do those Ivory Tower Boys know about the capacity of my men and my machines? I've spent a lifetime in this department and know more about this business than the rest of the company combined."

Fortunately for American industry most foremen take some middle view between the two extremes just expressed. To show how this middle view delivers the best results let us analyse the two extremes.

Experience has shown that the job of running a manufacturing concern is so complex that no one individual can know all the phases of it. But even if a man were a good Jack-Of-All-Trades, there are some things he would prefer to do mainly because he has superior talents in the particular job requirements.[1]

But what has the running of an entire business got to do with running one small department? The answer, of course, is quite simple. Running a small department in any concern is akin to running a small business. And just as the president of a large or medium sized company surrounds himself with a corps of specialists (legal counsel, market researchers, etc.) so the head of a small business should welcome help.

Six years ago the Ford Motor Company, with its 6,000 supervisors, recognized the need for an extensive management development program. Work standards had slipped during World War II and even Ford supervisors at war's end had just about lost sight of what their main function was—to operate their departments at a profit.

To re-focus attention on an important factor in profit margins (direct labor costs), the Ford Company made an excellent 20 minute sound movie, "Steering With Standards." This movie shows the importance of running a department at the lowest possible cost so as to meet competition. The supervisor has available at all times a staff of competent specialists—time study men and methods analysts—to help him reduce his costs. The need for good work standards is dramatized by Sam (a veteran foreman) who points out to Dave (a younger supervisor) what would happen if there were no work standards: Costs would mount and work loads would be unevenly distributed. The picture ends with Dave convinced of the need for sound work standards.[2]

"Fortunately for American industry most foremen take some middle view between the extremes."

Incentives For Supervisors?

Is there any incentive for a supervisor to administer an incentive plan? This question raises two other questions: (1) Are financial incentives for supervisors sound? (2) Should a supervisor share in the incentive earnings of his operators?

These are difficult questions to answer with a "yes" or a "no" answer. Here are some of the arguments in favor of foreman bonuses: (a) Foremen bonuses intensify the foreman's interest in reducing his costs and making a large profit for his department. (b) Foremen bonuses relieve management of the periodic responsibility of evaluating supervisors for merit increases.

Against foremen's bonuses are these arguments: (a) Because such bonuses emphasize immediate gains, foremen often are prone to neglect long range considerations for immediate results

---

[1]Frederick Winslow Taylor, father of scientific management (and time study), said a good foreman should possess the following nine qualities: Brains; education; special technical knowledge (and manual dexterity or strength); tact; energy; grit; honesty; judgment of common sense; and good health. Taylor, of course, recognized there was no man living who possessed all of these qualities to a high degree. "Plenty of men who possess only three of the above qualities can be hired at any time for laborers' wages. Add four of these qualities together and you get a higher priced man. The man combining five of these qualities begins to be hard to find; and those with six, seven, and eight are almost impossible to get."—SHOP MANAGEMENT, 1911, Harper & Brothers, page 96. Taylor attempted to handle this complex problem like any good engineer would: He broke the foreman's job down into components and then hired eight men each of whom took a small segment of the job. Such a procedure would, of course, be limited to large shops where scores of foremen were (are) employed.

[2]This film may be borrowed (or purchased) from the Ford Motor Company, Dearborn, Michigan.

(e.g. machine and departmental maintenance). (b) Because the profit of a particular department is often tied up with sales volume over which the foreman has little or no control, a foreman's bonus may be large when a mediocre job of supervision has been done, and vice versa. (c) If the bonus is large enough, the pressure for work volume may cause a foreman to slight quality.

So much for the general arguments in favor of and against foremen's bonuses. What about gearing a supervisory bonus system in with the incentive earnings of departmental operators? This seems logical at first thought. Such a system intensifies the foreman's interest in high production.

But shortcomings to the system begin to manifest themselves after such a system is in operation. Obviously, if a supervisor's bonus is geared directly as a percentage of the incentive earnings of the operators working under him, then such a supervisor does all he can to increase these earnings—including fighting for loose work standards. Of course the supervisor will deny that he favors anything but fair work standards. But it is difficult to see how anyone could be wholly objective in such a matter that is so intimately, if not directly, tied up with his own purse.

Foreman bonuses have a better chance of succeeding if they do not exceed 25% of a foreman's base salary. When they go beyond this, the pressure for expediency becomes very intense—permanent repairs, give way to temporary repairs; housekeeping and safety are neglected; product quality is constantly compromised (even where formal inspection departments are established); work standards become looser—faster.

The writer, therefore, favors foremen incentives on a very limited basis—limited in percentage and limited in time (until the plan has proved itself). But a sounder basis for such incentives would seem to be one based on periodic merit rating which would cover a number of disadvantages mentioned above instead of limiting the bonus to one factor only (incentive earnings of operators or even immediate departmental profits). The Lincoln Electric Company has for years recognized the limitations to the single-factor technique of bonus determination; so their plan recognizes four factors, I believe (productivity, job knowledge, contributions to product or plant improvements, and workmanship).

Deviations From Standard Work Pattern

What assurance do you have that the operator will perform the job as it is studied? This suggests two other questions: (1) Do you really want the operator to do the job as it is studied? (2) What price are you willing to pay (in time and patience) to insure the job will be performed as studied?

Unfortunately, the daily pressure for standards and piece rates is so great in most shops that few time study men ever have time to do any job designing. They accept the job as it is when the foreman requests a rate—unless gross defects appear in the job design. The result is, of course, the operator (and

"How can he remain wholly objective?"

Holding down job grievances.

occasionally the foreman) will do some job designing just as soon as the rate is set.

The classic example of this came to the writer's attention a few years ago. A woman operator told her machinist husband in detail what her job was. He fashioned a special fixture for her enabling her to double her earnings. The fixture was small enough so the operator could hide it whenever anyone approached her—and she did hide it whenever time study men or anyone else approached her.

This situation raises an interesting question. What is the best way to handle a situation where an operator has discovered an easier and faster way of performing an operation? One way, of course, is to do nothing more than re-time the job, set a new (lower) rate, and go on about your business. This way frequently ends up in a slow down or a walkout.

The other way is to arrive at a common understanding with the operator as to what the job improvement is worth; pay him a flat sum (i.e. buy the idea from him); re-time the job; and put a new rate on it. Where an active suggestion system is in operation, this rational approach is simple and easy. Where no suggestion system is present, act in a way that leaves everyone happy.

What price are you willing to pay to insure the job will be performed as studied? This question, of course, is predicated on the assumption the job is properly designed. Let us explore, for a moment, why operators deviate from an established job pattern. Why don't they perform the job the same way after the observer leaves the production floor as they do when he is making his observations? There are many reasons for this departure.

One reason is no one has ever taken the time to write up a standard written instruction on the job. Hence there are as many different ways of performing the job as there are operators, machines and tools, production runs, material variations, ad infinitum. The first step to insure that a job will be performed as time studied would be the issuance of a standard written instruction sheet on the job—in much the same manner that a blue print accompanies jobs throughout a shop.

But standard written job instructions,

How to pay multiple machine operators.

broken down into fine elements of right and left hand or man-machine, take time to develop (and require a little knack in writing up). Because of this time (and writing skill and patience), very few industrial engineers or companies go to this trouble. And because most operations in American industry are of a job shop nature, failure to write up detailed job instructions is frequently rationalized by saying, "It would cost too much for our short runs". Yet very few shops will start a run of one part without a blue print on the part—compared with the practice 100 years ago of starting production runs with nothing more than a sketch on the back of an old envelope. Must we wait 100 years before we get around to writing up standard detailed job instructions—or will we discover soon that we are spending hundreds of man-hours monthly in job grievances that could be eliminated or minimized by such a simple meeting-of-the-minds tool as standard written instructions?

There is one more implication to the question appearing at the start of this section. Suppose an operator uses 20 strokes of a file to deburr a part while he is being time studied. Then as soon as the rate is set on the job, he uses only 6 strokes (or one pass of a piece of emery cloth). The typical time study will record this element as "De-burr part." The careful analyst will write this element up as: "De-burr part with 20 strokes of a 7 inch medium file." Before leaving the production floor the careful analyst will call the foreman's attention to this or other unusual job elements; or he will allow just enough time for his estimate of how many strokes he believes are necessary for de-burring the part (time for 6 strokes in this instance).

"The foreman can make or break the incentive plan."

There is, of course, the converse of this situation. At the start of a production run very little de-burring may be necessary. But either due to changed tooling, materials, or quality requirements, the number of file strokes to turn out an acceptable job might go from 6 to 20 strokes. When this happens there usually ensues a grievance ("we can't make incentive") and only after days, weeks, months, or years of arguing are the real reasons discovered.

How To Pay Multiple Machine Operators

"What method of payment to multiple machine operators is fair to both the company and the operator, when the operator is on incentive?"[3] The payment

[3]The subject of time study and incentives is too large to cover in a series of magazine articles. Hence we cannot answer all of the questions and problems in every reader's mind. Occasionally, however, we receive a question like the one quoted here that has sufficient general reader interest to warrant including it within the main text of these articles. This question was asked by Mr. Joseph T. Reilly of the American Brake Shoe Company.

of incentive wages to machine operators should be based on a number of considerations. (1) How much of the normal operator's skill and effort is required in getting out production under present machine speeds? (2) How much are bench operators and other manual operators averaging on incentive? (3) What does the contract call for?

Many slow machine-paced jobs are put on incentive years too soon. Suppose a group of machines requires the constant attendance of an operator but only demands 10 per cent of his potential skill and effort. Of course, it would be convenient if you could give this operator something else to do during the other 90 per cent of his time—and this should be done, if at all possible. For the time being, let us assume one operator (or a small group of operators) can utilize only a fraction of their potential speed over 8 hours.

There are several ways of dealing with this situation. (a) You can pay such operators the same incentive earnings they would be making, if they were permitted to use all of their potential energies (on the theory they should not be penalized for machine speed limitations); (b) you can pay these operators day-work wages until such time as you can overcome the machine speed limitations (or approach the 80 per cent operator potential point); (c) you can pay these operators something between these two extremes—say 90 per cent of anticipated incentive earnings.

The writer rejects the first of these solutions on the basis that no one should be paid 100% bonus for less than 100% incentive skill and effort—regardless of whose fault it is. On the other hand, base or day work pay which may be from 15 to 30 per cent under incentive earnings would be unfair in most situations regardless of how little skill and effort was required of the operator; moreover, such daywork jobs are hard to fill especially in plants where incentive operators are earning from 20 to 40 per cent above base or daywork pay. For these and other reasons the writer prefers the 90% figure —90% of anticipated incentive earnings (not 90% of average incentive earnings).

How much are bench operators and other manual operators averaging on incentive? The 90% compromise figure just recommended may be difficult to sell, if a company has established a 15% incentive differential but the shop incentive is 50%. Thus the 90% figure based on anticipated incentive earnings instead of average incentive earnings would yield a 13.5% incentive to a group of machine-paced operators compared with the shop average of 50%. This poses some problems which center around the $64 question: "How do you correct a run-away incentive pattern?" The writer plans to answer this and other pregnant questions which were not included in the original Editorial Board list in future articles in this series.

But all of these ideas and philosophies about multiple machine operator pay are academic, if the subject is covered in the contract. And if the problem is sufficiently frequent in any plant, it should be covered in the contract. The foregoing discussion, therefore, may serve as a base line for contract negotiations covering this point.

Summary

In summary, then, we can say the foreman can make or break any wage payment plan. Because the foreman is the one who will be charged with the chief responsibility for the success of an incentive program the foreman should have some part in the original planning of the program.

Work standards as an integral part of an incentive program should be administered by the foreman—with whatever assistance he believes he needs. Whenever a company completely divorces wages and work standards from a foreman, then it is shifting the res-

ponsibility for the successful administration of an incentive program from the line personnel to the staff. And this usually results in operators and supervisors lining up on one side and top management and industrial engineers on the other side; indeed, it often reaches the point of a conspiracy—the supervisor and his operators "framing" top management and the industrial engineers.

The true role of the supervisor in the administration of a sound incentive program is to supervise—to direct the system even though he may not have the time or the ability to set work standards.

A system of cheeks and balances is often provided to afford the supervisor the widest possible discretion in such matters without permitting him to bankrupt his department. Thus many firms will delegate the responsibility of setting work standards to a standards or time study department; but they permit their supervisors to withhold any standards which seem unfair — either to the company or to the operator. This seems like a good approach. Give the time study department the authority to set proper work standards, but grant the supervisor the authority to veto or withhold any standards with which he is not in accord. This does not mean, of course, that any supervisor should change time study standards to suit his fancy.

End of Part 5

Author's note: I am deeply grateful to the many people who have written to the Editor of the BLUE BOOK about these articles. Such comments spur me on to do the very best job I can—to help you and your companies do a better job in this fascinating and complex profession of getting out more production at less cost with more fun. Merry Christmas to all of you. And the very best of luck to you and your companies in 1955. Harold R. Nissley.

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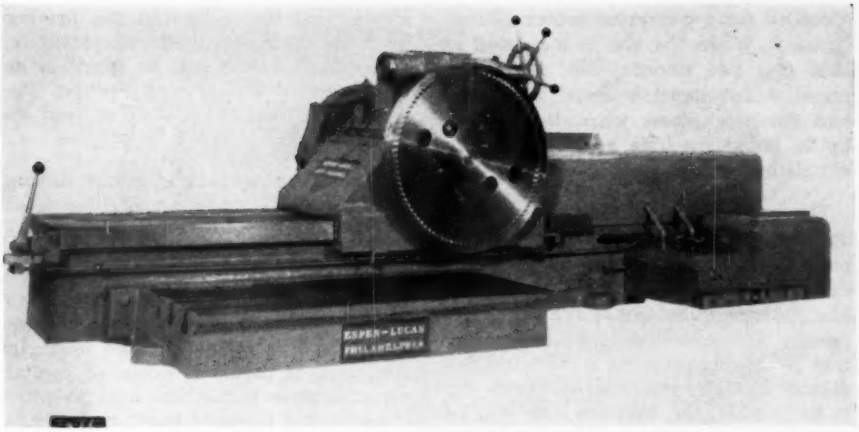
Cutting Force: Its Effect on Machine Design, Workpiece, Positioning, Maintenance

By **Horace A. Frommelt,** Consulting Engineer
Chicago, Illinois

A STRIKING instance of the effect of cutting forces on machine tool design is a rotary planer as used in the structural industry for the milling of beams and columns and similar structural members using high speed steel cutting elements for this operation, figure 1. Since the end of a beam or column is necessarily made up of relatively thin sections the surface foot rate must be held to not more than 60 feet per minute. By and large, the vast majority of beams and columns that are end milled have flange and web thicknesses of less than one inch. The usual rotary planer has a three to four foot diameter milling head containing in the neighborhood of 45 to 55 high speed steel cutting inserts. Thus in a 4 foot diameter head having 56 inserts (and this is the common specification) the tooth pitch or distance from one tooth to another is approximately 2½". (The 4' diameter milling head has 144" in its circumference; with 56 high speed steel blades the tooth pitch or distance from cutting edge to cutting edge is approximately 2½".) Thus, it can easily be seen that never more than one tooth can be in contact with a flange or web at any given instant. Hence the necessity for restricting the sfm to 60 when high speed steel blades are used.

The customary horse power on the spindle of a rotary is 15 which means that 495,000 ft. lbs. per minute of energy

Cutting force is the most important factor in machining. If workpieces can be designed so as to reduce cutting forces the cost of processing will be reduced. The cost of operating a machine in which cutting forces are held to a minimum by operating at high sfm rates is only a fraction of the cost of operating at lower rates. Workpiece clamping is vitally affected by these forces. Lower cutting forces will result in better finishes.

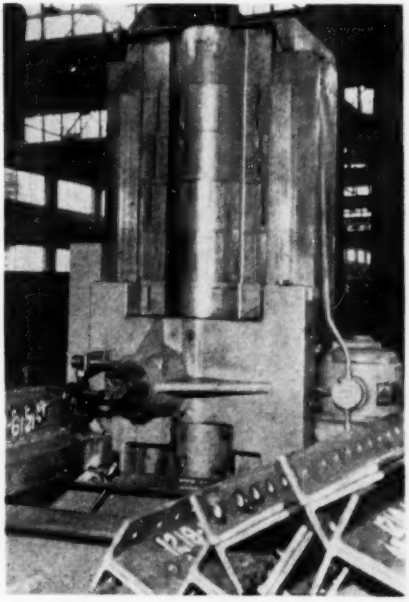


1. A heavy rotary planer used for the milling of structural members.

will be delivered to this head when all the power is being consumed.

At 60 sfm the pressure developed between one of these cutting elements and the web or flange of an "H" beam is 495,000 divided by 60 or 8,250 pounds. Thus when a high speed steel tooth of this milling head engages the web or flange more than 4 tons—to be exact 4¼ tons—of pressure is exerted or developed at the point of contact between the tooth and the beam, flange or web. Obviously, this 4¼ tons of pressure must be absorbed by gear trains, pedestals, bearings, etc. The design of rotary planers is in consequence massive, as indeed they must be, and the entire structure is so set up as to be sufficiently rigid for this operation. In spite of this, the effect not only of these massive cutting forces but the very nature of the interrupted cut frequently result in damaged machine parts which in turn causes down time with its consequent loss in productive capital investment and productive hours. The results of reducing these cutting forces by introducing carbide dramatically affects machine tool design as can be seen in the machine elements that are

2. A machine performing the same operation as the machine in figure 1. Note the reduction in cutter size due to a reduction in cutting forces. This is an example of how cutting forces can affect machine design.



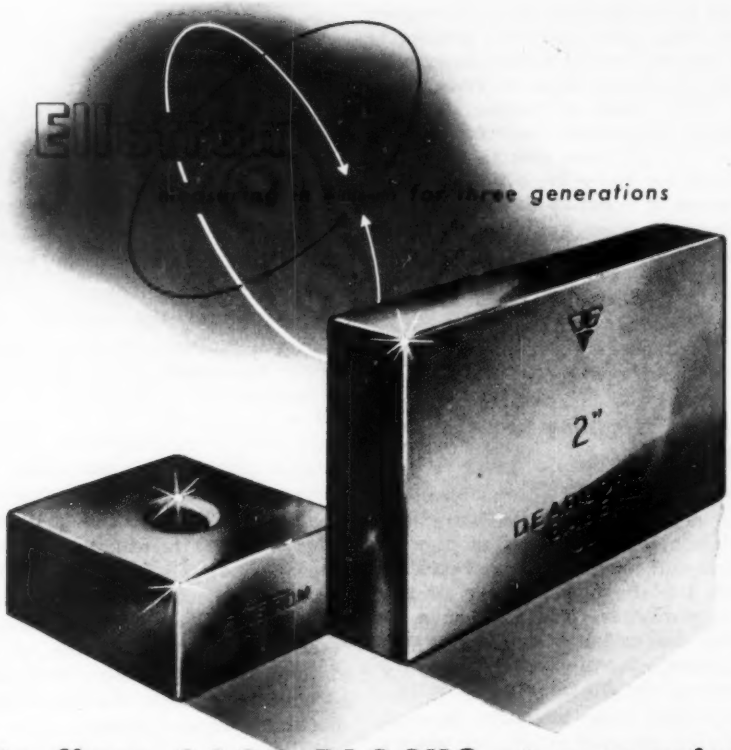
specified for a converted rotary planer, figure 2. When the sfm is increased to 1000 feet per minute, the pounds of pressure developed between the cutter and the workpiece, when the full 15 hp is being used, is reduced now to 495 pounds.

The reduction therefore in the same operation is from a staggering 8250 pounds to 495 pounds. Obviously this drastic reduction in the cutting forces has a large effect upon machine tool design. For example, the spindle for this 15 hp machine is a meager 2¾" diameter. All of the other elements are in proportion, the bearings now can be specified as precision ball and roller thrust of a very small size. The cutting pressure of 495 pounds is insignificant on the various machine elements that must absorb these cutting pressures. The spindle revolves at 1200 sfm and hence a high speed motor can be specified—usually 1800 rpm—and this in turn means that the weight of the driving motor is drastically reduced. Actually, this spindle motor can be specified as 3600 rpm which in turn reduces the weight and size of the milling head by as much as 33-1/3%.

"'Rule No. 61 . . . Female Employees, Hair-Dos: For reason of safety . . .'"

It is this important effect of cutting forces on machine tool design that must be constantly kept in mind when specifying machine tools. If the operation under consideration can be performed at sfm rates that are associated with carbides, then correspondingly high spindle speeds can be insisted upon. In fact, it is a precious waste of capital investment in a machine tool to purchase in that machine tool a wide range of spindle speeds if these are to be used only in a small fraction of the entire range. Thus if carbide can be used over a very narrow range of jobs then the spindle speeds will be restricted to a very small percentage of the wide range that is generally built into machine tool equipment. Yet if the entire range is purchased in a machine it must be designed to withstand the cutting forces delivered at the lower surface foot rates. It is not uncommon at all therefore to find that many operations are being performed, day in and day out, at the upper speed ranges which never call for a selection in the lower and intermediate ranges. This represents a very decided waste of capital investment money.

The point is that if a machine is to be purchased for tool room operations or jobbing operations, or even for jobs that are small lot, then the wide speed range is entirely justified along with the price that must be paid for the machine parts designed to withstand the cutting forces at the lower speed ranges. However, many operations today in American industry are performed without change from day to day and even from year to year. If such operations can be performed with



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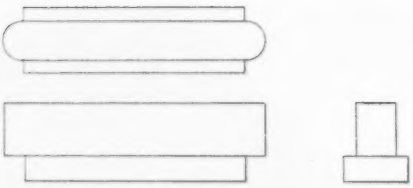
cutting materials associated with higher surface foot rates, and most frequently they can be if an intelligent analysis of the cutting force phase is made, then it is sheer waste of capital funds to purchase equipment built for cutting forces 5 to 10 times greater than will be called for under the conditions here laid down. It is not at all uncommon to see speed dials on machines obviously unused except for one or at the most two positions. The others present the appearance of complete newness or are wholly covered over with machining dust that speaks eloquently of their complete desertion.



3. The design of this interpole called for rounded ends. It must be machined with form cutters and therefore with high speed steel. This meant a low sfm rate, high cutting forces, powerful equipment. The design of the part determines the cutter, equipment, horsepower and production rate of the part.

The effect of cutting forces on the workpiece

The other effect of cutting forces on design has to do with the workpiece. Here again, the force exerted between the tool and the job can and does influence the shape and design of that job or workpiece. And if it does not actually change the design it can very easily change the processing, frequently in terms of sizeable dollars and cents.

The design of an interpole, figure 3, called for rounded ends, as shown. These, of course, must be machined by means of form cutters and therefore with high speed steel. This in turn meant that the sfm rate must be reduced to at least 60, and very likely less, since form cutters are notorious for their inability to operate at anything over 60 feet per minute.

Note that the design of this interpole—(an interpole for a large subway motor) with the end design as indicated in figure 3 immediately determined the type of equipment that could be used both as regards the machine tool and the cutter, as well as the sfm rate. Since this is set at a niggardly 60 or less the cutting forces were correspondingly high and hence a milling machine capable of delivering power at these low rates must be chosen. The design of the interpole called for a form cutter and this immediately set the rate at which the job could be done. This in turn influenced and determined the expenditure for such perishable items as the cutter. Obviously, the cost of a form cutter for this operation is relatively large and the cost of reconditioning such a cutter—regrinding it—is extremely high and out of all proportion to other cutters.

Note what happened when the design was changed, as indicated, figure 4. The engineering department agreed that the end of the interpole could be specified as shown. This immediately instituted a chain reaction beginning with the type of cutter that could be used, the cutting forces, the machine on which the job could be performed, the cost of the cutter, the cost of reconditioning, etc. But it all started with a change in design which called for a change in cutter and this in turn resulted in greatly reduced cutting forces. The operation is now performed with a small diameter face mill and the angular faces are milled at 500 sfm rate per minute. A series of the interpoles are set up on a magnetic chuck

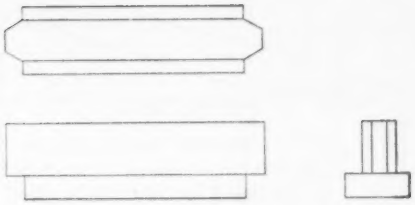
which in turn is possible due to the greatly reduced cutting forces. The chuck is so arranged that 12 of these interpoles can be machined at one time on an angle plate. The series of cuts is clearly indicated, figure 4.

Note that by reducing cutting forces, made possible by a change in design, a face mill with carbide inserts can be specified instead of a form cutter. The following results were achieved: 1. A much smaller machine can now be used to perform this operation. Therefore, in this operation the interest on the capital investment to be charged against this job will be greatly reduced; 2. the cost of the carbide face mill turns out to be one-fifth that of the form cutter; 3. the cost for reconditioning the cutter is even more drastically reduced from $50.00 to approximately $8.00; 4. the increase in production—perhaps the most important result — amounted to 250%.

Here a change in component design results in cutting pressure reductions which in turn drastically affect the entire operation.

One more illustration of the effect of cutting force reduction on workpiece design and processing. In the structural industry the milling of the ends of chords, figure 5, is commonly specified. With the traditional rotary planer and its 60 sfm the cutting pressures are so large that they tend to collapse the thin plates making up the chord. In consequence it has been necessary to temporarily weld in supports as indicated, figure 6. This operation is costly because it is time consuming. And therefore it adds expensive man hours to the final cost of the product.

With the introduction of carbide and the specification of 1000 sfm for this operation it is now possible to mill the ends of these chords to a depth of ¼" without benefit of supports. The cutting pressures have been reduced from several tons to several hundred pounds.

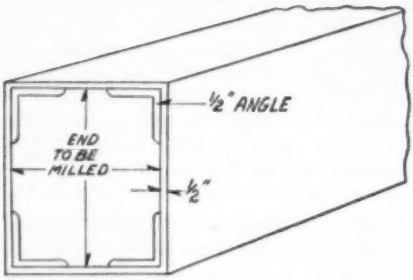


4. The same interpole with design changed. A chain reaction was set up influencing the cutter design, sfm rate, cutting forces, equipment to be used, horsepower and final production. Twelve interpoles can now be machined at one time. Production skyrocketed.

The tendency to collapse these light plates is entirely removed. The increase in production is even more startling, and is due primarily to a change in technique which, basically, is built around a change in cutting forces. Formerly the milling of the end of a chord as shown called for 30 minutes of cutting. Now this operation is performed in less than 2 minutes. This reduction does not include the reduced cost of processing as effected by the absence of a change in metal removal which removes the need for a temporary brace as indicated in figure 6.

A final example of the effect of the reduction in cutting force on processing dramatically points up the influence of cutting forces.

Connection plates ¼" thick riveted to the end of a chord, must be machined on the end as shown in figure 7. With the traditional technique using the rotary planer the forces are so massive it is impossible to mill this connection plate after it has been connected to the chord. Hence it was necessary to machine the edge of this plate, usually in a shaper, and then rivet the connecting plate to the chord. A final operation of



5. Ends of these chords have to be milled. With traditional rotary planer cutting forces are so large they tend to collapse the thin plates making up the chords.

properly aligning the connection plate on the chord is necessary.

But with the change in technique, specifying carbide cutters and consequent reduction in sfm, it is entirely practical to mill the unsupported plate to a depth of ¼" at 60 ipm feed rate. The connecting plate in this operation is unsupported and yet the ¼" depth of cut can be comfortably taken at the 1000 sfm rate.

It is interesting to note also that another method generally employed for the machining of this plate after it is riveted to the chord is effected with the use of the rotary planer (60 sfm) but with rigid supports under the plate throughout its entire length and close to the edge to be machined in the rotary planer. Obviously, such operation calls for a considerable expenditure of man-hours in setting up the job and hence is relatively expensive. Whether the connection plate be rotary planed before or after riveting to the chord results in very little change in the final cost figures. Either way, the operation is expensive. But when milled with carbide at 1000 sfm rate and at correspondingly low pressures the operation is performed with a minimum of time and with no expenditure for unusual support or setup activities.

Effect of workpiece on cutting forces

In reverse, the nature and specification of the workpiece has important effects on cutting pressure selections. If the component is made up of thin sections the selection of the cutting force must have this primarily in mind. It is of course obvious that the thinner the section to be milled, the less the power that can be made available for the removal of metal. But once having determined that only a light cut can be taken at a moderate rate then the next problem is to reduce the cutting forces within this framework. It must be remembered that the amount of power required to remove metal depends upon the width of the cut, the depth of the cut, and the rate at which the metal is being removed. If the width is set and cannot be changed, as for example, the matching edge of a crank case-pan, then the depth of cut and the rate can be altered to change the amount of power required. The amount of power required should be experimentally established. If a removal rate, say of 10 cu. inches per minute, is established as satisfactory, then the cutting pressures can be further reduced by increasing the sfm rate. Obviously this juggling of the sfm rate can only be done within the limits of the cutting materials, as well as the technique of milling that can be used or is available. However, if carbide, for example, is available and the operating characteristics of the machine permit its use, then the highest possible sfm rate should be employed within the limitations set by the number of cubic inches per minute to be removed. As the sfm rate is increased the cutting pressures will be reduced and this in turn will assist in arriving at better finishes and, other things being equal, in better results in other respects.

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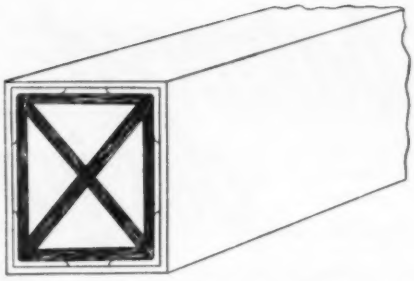
If the component is one of a small job lot, then it is frequently feasible to increase the sfm rate deliberately beyond that called for under production conditions as determined by good cutter life or the number of pieces between grinds. In other words, if only a few pieces are to be milled, then it is justifiable to increase the sfm rate considerably, even doubling it, to decrease the cutting pressures and thus reap benefits from this reduction that would otherwise be denied the operation.

But even if the job is set up on a production basis, then careful study should be given to the proper selection of cutters that permit the highest possible surface foot rate specification in terms of satisfactory number of pieces milled between grinds. It is now well established that certain types of milling cutters, using carbide, can operate at much higher surface foot rates than others though the general specification is the same and the job is the same. This careful selection of cutters is particularly urgent when a production operation is being analysed. If the sfm rate can be increased from the usual 500 to 750 then the decrease in cutting pressure will also be one-half. For example, if a 10 hp cut is being taken at 500 sfm, then the cutting pressure is 660 pounds. If the sfm rate can be increased to 750, then the cutting pressures are reduced to 440 pounds. To emphasize this point, if the surface foot rate can be increased to 1,000 the reduction is from 660 to 330.

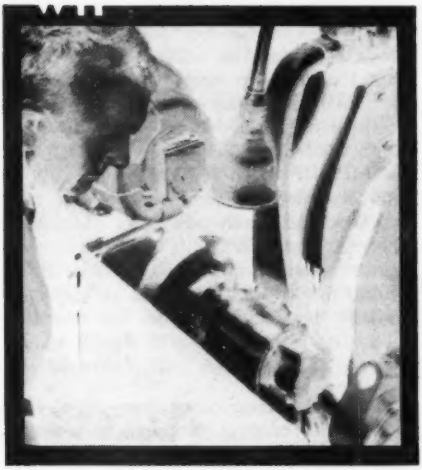
If the increase in sfm is made with the feed rate remaining the same, it is obvious that the tooth load or the amount of metal removed by each tooth will be reduced proportionately. This is another way of saying that the pressure is decreased as the sfm rate is increased. In all of these instances it is, of course, understood that the feed rate remains the same. Thus the tooth load



6. The ends of these chords have to be strengthened before milling; hence welding of insupports is required. This is time consuming and costly. With the traditional rotary planer and a slow sfm the cutting forces are terrific. By introducing carbides and specifying a 1000 sfm the cutting forces are reduced, supports are not needed, production is increased and the entire project is speeded.

or the amount of work done by each cutting element is reduced and hence the pressure is likewise reduced.

If the solid wall or member of a workpiece is to be milled, then the opposite approach is justified. The amount of power that can be applied to the removal of metal from a job in which the wall thickness is such that there is little question about rigidity, then the maximum amount of power can be used to remove metal. This is another way of saying that the pressures can be set at the minimum within the horse power and the sfm rates that are available; in this instance the horse power in the milling machine determines the feed rate. The sfm that can be used is determined by the cutting materials and tool design. This will then determine the pressure that is generated between tooth and work. For example, if a 2" wide piece is to be milled to a depth of ¼" with a 10 hp machine the



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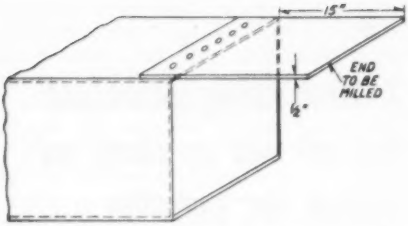

7. Connection plates ¼" thick riveted to the end of a chord must be machined on the end as shown. With traditional techniques cutting forces are so massive it is impossible to mill this connection plate after it has been connected to the chord. Hence, it was necessary to machine the edge of this plate, usually in a shaper, and then rivet the connecting plate to the chord. With change in technique, specifying carbide cutters, it is possible to mill the unsupported plate to a depth of ¼" using 60 ipm.

feed rate is automatically set at 20 ipm. (The calculation is: 2" by ¼" by 20 ipm equals 10 cubic inches per minute or 10 hp). But if the sfm rate is 500, then the cutting pressures are 650 pounds. But if cutting elements permit the specification of 1,000 sfm, then the pressure is reduced to 330 pounds. The approach is through the hp that is available and then to the lowest possible pressure permissible with the cutting materials available, which set the sfm rate for the cutter.

Thus it is frequently possible to increase the tooth load, or what is called the chip load, from say .005" to .010" or more. This means that leaving the sfm rate the same the feed rate can be doubled or more by increasing the amount of metal to be removed by each tooth. Here the cutting pressures are increased as the feed rate is increased since this setup calls for more power. But the cutting pressures are kept to a minimum for these tooth loads by using the highest possible sfm rate that can be specified for the cutting material available and the design of the cutter to be used. Increasing the tooth load from .005" to .010" means doubling the ipm or feed rate. This in turn doubles the feed rate which calls for twice as much power or energy. If, therefore, at .005" chip load, 10 hp was being consumed, then at .010", 20 hp would be called for. This is approximately true and goes on the assumption that the width and depth of cut remain the same in both examples.

The important point here is to decrease the cutting pressure to a minimum by specifying the highest possible sfm rate consonant with the greatest possible cutter economy, that is, to make it possible to produce as many pieces between grinds of the cutter as possible, at the same time keeping the pressure to a minimum.

Workpiece clamping

Workpiece clamping is naturally very much affected by the pressures developed between the cutter and the workpiece. This is best illustrated by reference to an actual instance, namely, the milling of the ends of beams and girders. With the traditional rotary planer operating at 60 sfm and using 15 hp as previously noted, the cutting pressure generated is 8,250 pounds or 4¼ tons. With these forces generated between tooth and flange or web, the necessity for heavy supports and tight clamping is obvious. With the same amount of hp required to perform this operation at 1,000 sfm the pressures are reduced to 495 pounds. Under these conditions it is unnecessary to clamp the heavier beams to supports; the weight of the member is sufficient to hold it in place against the cutting forces. The lighter structural members

can be reasonably clamped and thus less time is consumed and above all there is little or no distortion in the workpiece.

The lighter the clamping the less distortion and hence the greater the accuracy that can be machined into a job. Again a chain of events takes place that results in manifold advantages. The lighter the cutting forces the lighter the clamping and hence the less time for the setup. The reduction in man-hours immediately shows itself in lower unit costs. The lighter clamping, in turn, results in less distortion and this in turn effects greater economies because subsequent operations are unnecessary and the percentage of rejects is decreased.

It is also possible with this technique of machining, using lighter cutting forces, to make use of specially designed magnetic chucks. With the advent of carbide it became possible to specify the low voltage heavy duty magnetic chuck for the holding of workpieces that formerly required massive clamps and hold-down devices. With carbide surface foot rates it is possible to use the very advantageous magnetic method of holding. The same holds true for pneumatic and hydraulic clamping which while available in many sizes sufficient for the most rugged machining operations are given every possible advantage when the cutting pressures are reduced to a minimum. Their design, calling for reduced holding, becomes far less expensive and yet at the same time their effectiveness is not disturbed. In fact, the lower the clamping pressure the smaller the distortion in these devices themselves and hence their greater effectiveness.

Cutting forces and the positioning of workpieces

Cutting forces play an important part in the positioning of workpieces. While it is always true and safe to say that a workpiece should be set as close to the solid member of a machine tool it is also true that as the cutting pressures are reduced the less the need for extraordinary measures in this regard. An example of this was referred to previously when reference was made to a current operation on a bridge chord. A connecting or tie plate is riveted to the end of this chord and extends an unsupported distance of 15". As indicated previously the former technique with heavy cutting pressures called for a rigid support underneath this plate. With cutting pressures being reduced down to 1/20th of their former magnitude it is no longer necessary to support this piece.

In the same vein, it becomes possible to do a far more respectable machining operation at the higher surface foot rates when a workpiece is set close to a column of a milling machine. It is always considered bad practice to set a cutter farther from the column face of a milling machine than is necessary. Assuming that a cutter is set as close as the job specification permits, then it is plain that if the cutting forces are reduced many beneficial effects will follow.

In fact, under the conditions just referred to, it is frequently possible to eliminate a subsequent machining operation such as grinding. Thus, it is plain that if the cutting forces are reduced by one-half, by doubling the sfm, other things being equal or remaining the same, then the finish will be far superior. It may then be possible to eliminate a subsequent grinding, milling, lapping or other operation. The time saved is not merely machining but also setup.

The effects of cutting forces are constant and abiding, whenever and wherever metal is being removed. Discussion could profitably be extended through numerous machining operations and setups to emphasize this all important fact in metal removal.

It will be necessary, however, to re-

strict this discussion to one more facet of cutting force effects, namely, what these forces do to maintenance.

Cutting forces and maintenance

In the first place, the day to day maintenance is affected decidedly by a reduction in cutting forces. Normal or usual adjustments are more or less frequently called for such as on table screw and nut and gibs of various moveable members. With a reduction in forces such adjustment is much less frequently necessary and while this in itself is worthwhile, the major consideration is the reduction of wear between these machine members. Another item—and it can be of major importance—is lubrication. When the pressures are reduced then the need for lubrication is reduced. More important still, as pressures are reduced such members are seldom galled or scored.

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the reduction in major repairs to gear trains, bearings, and similar parts and members with the reduction in cutting forces. This is so noticeable under actual operating conditions that the attention need only be called to it to appreciate its importance.

When cutting forces are reduced from 8¼ tons to 450 pounds, repairs and replacements of gear trains, particularly pinions and large bull gears, are seldom necessary. With the pressures prevailing in the traditional technique the breaking out of gear teeth, the cracking of pedestals and bearing caps is all too common. Any slight increase in the cutting forces due to an abnormally heavy cut increases the already massive forces to the end they cannot be absorbed by these members. Hence breakage and damage that is major in its proportions is all too frequent.

Summary

To summarize, cutting forces as have

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been discussed here are important in their results and effects in numerous ways.

In this discussion, their effect on machine and workpiece design clearly proves that if a workpiece can be redesigned so that cutting forces can be reduced the cost of processing will be drastically reduced; likewise, the effect of the reduction of cutting forces on machine tool design. The cost of operating a machine in which cutting forces are held to a minimum by operating at high sfm rates is only a fraction of the cost of one operating at lower rates.

Cutting forces affect the machining of workpieces that vary in cross section. These sections much be machined in manner and technique different from thick sections. Yet within the framework of the permissible operating characteristics cutting forces can be lowered to bring about more favorable machining results.

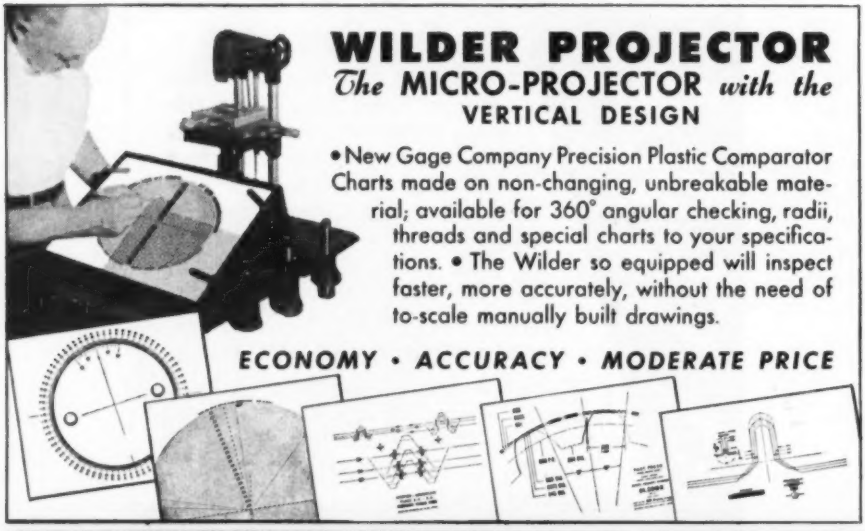
Workpiece clamping is vitally affected also by these forces. When clamping is less massive, distortion is less and this in turn sets up a chain reaction that adds up to more favorable results.

Assuming proper workpiece setup, for example in a milling machine, lower cutting forces will result in better finishes which in turn result in cancelling subsequent operations.

Finally, machine maintenance is vitally affected, as is to be expected on careful consideration, by lowering pressures between tooth and job. If cutting forces are drastically reduced, as indeed they can be, then major maintenance operations can be avoided.

In short, cutting force is the most important factor in machining.

The End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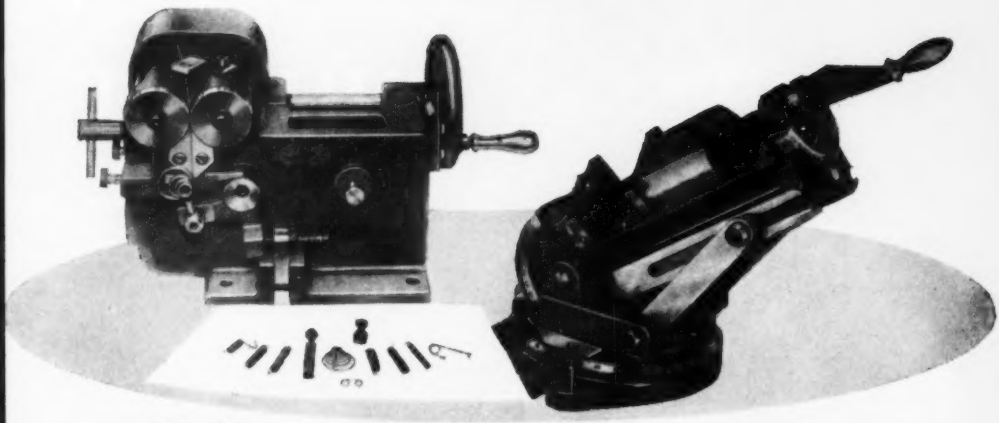

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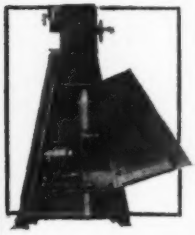

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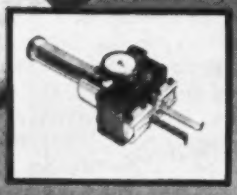

This Bryant gage checks the diameter and roundness of internal grooves up to 5". Four sets of segments are adjustable to cover the range of standard "O" ring grooves and four different sets are adjustable to cover the range of snap ring grooves. A movable segment actuates the dial indicator which gives direct reading of any variation from basic size.

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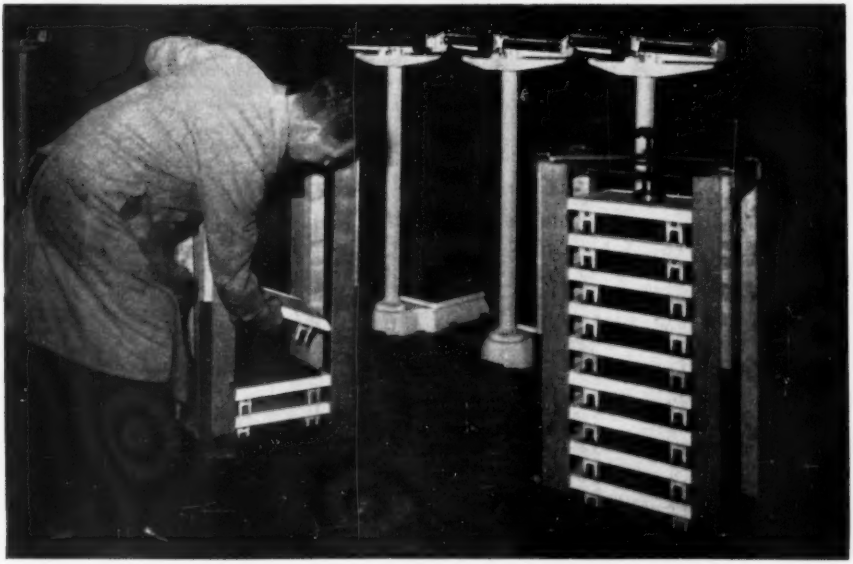
Adhesive-Setting Jig is Transportable

By George Middlebury

PLATFORM type scales are manufactured in large batches at Avery Ltd., Yorkshire, England, and a feature of the scale is a rubber mat fixed by an adhesive to the platform. To apply pressure to the rubber mats until the adhesive had hardened, the manufacturer placed a board over the mat and a number of solid, heavy weights upon this. This method had several defects, the main ones being the labor involved in loading the weights into position and the large number of weights needed to obtain continuous output.



Nine scale platforms can now be clamped and pressure applied to the rubber mats by means of the caster-mounted jig shown in the foreground of the photograph. The jig comprises a welded steel base plate mounted upon four casters with an L-section wooden upright at each corner. Wood was chosen in preference to metal since it had less tendency to damage the enamel on the finished scale platforms.

The 9 platforms stand within the framework formed by the wooden uprights, each having a board placed over the rubber mat, the feet of platform resting on the board of the one below it. Four L-shaped clips are secured to the top ends of the wooden uprights and under these fit the ends of the four arms of a steel spider. The spider has a central screw with a large diameter pressure piece at its lower end and this

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exerts pressure on the pile of scale platforms within the jig.

The jig uprights are supported at their top ends by means of two tie bolts which stiffen the assembly. Some stiffening of the lower ends of the uprights is provided by pieces of angle iron secured thereto. Advantages of the jigs are mobility, less labor involved in attaining the desired pressure and saving in floor space.

The End

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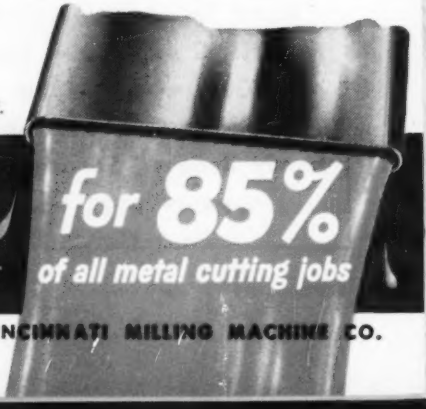

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Shop HINTS

Making Accurate Tapered Plugs

By **F. E. Riley**

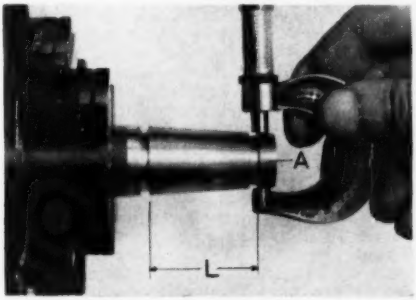
The best way to check the accuracy of a tapered hole is to use an accurate taper plug gauge. Unfortunately, taper plug gauges are not available for all jobs, so the engine lathe operator often has to make up a gauge for his own use on the lathe before he can start boring the holes required. Not all shops are equipped with the precision tools needed for checking accurate taper plug gauges, but there is a method of making taper plugs of high accuracy in the lathe using standard micrometer callipers and other readily available measuring instruments.

The method of measuring an accurate taper plug is illustrated in the photograph. The large end of the taper has a sharp edge to which the micrometer can be applied easily. The small end of the plug cannot be measured accurately by this method but if the extension piece A is machined on the small end, a second sharp edge is obtained to which the micrometer can be applied. The tapered surface extends from the extreme end of the piece to the large diameter near the chuck and is broken by the groove machined in the periphery.

Most cylindrical tapers can be checked accurately if the large and small diameters, together with the longitudinal distance between them, are given. The arrangement shown in the photograph gives the two required diameters and the distance L, between them, can be obtained precisely in one or two different ways. If the plug is being machined between centers, it can be removed from the lathe and stood vertically on a surface plate so that length L can be obtained by measuring with a vernier height gauge. In the example illustrated, a good quality vernier calliper gauge can be used. Another way is to machine the groove with a sharp parting tool and then traverse the tool along the job by means of the compound slide rest screw until it has travelled a precise distance, as indicated by the micrometer dial. The face at the large end of the gauge can then be skimmed.

For the purpose of measuring the taper on the gauge, length L can be any convenient size but it is important that its length should be known to four decimal places, if possible.

For the purpose of measuring the taper plug with a micrometer, we wish to know the difference in the diameters of the large and small sharp edges, and



the distance between them. The formula for obtaining this difference is:
Difference=2 tan x L
In which x is half the included angle of the taper given on the drawing and expressed in degrees. L is the length between the two sharp edges. This formula is for those tapers dimensioned on the drawing by means of an included angle and the maximum diameter.

Where tapers are expressed in inches per ft. the formula is: $\frac{\text{ins}}{12} \times L =$ difference between the large and small diameters. Inches per ft. can be expressed as a decimal fraction for easier calculation by dividing 12 into the number of inches specified per foot of taper. Example:—3½ ins. per ft. $= \frac{3.5}{12} = 0.2916$

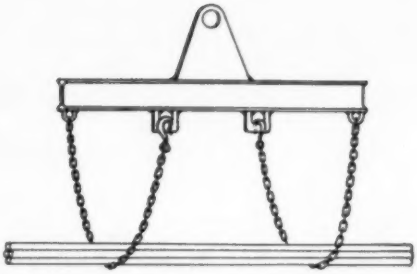
If the machine has been set correctly for the taper required, the difference between the micrometer readings taken on the large and small diameters should equal that obtained by using the appropriate formula given above. If the difference is larger, the taper is too steep and if smaller the taper is too "slow." By this means, the operator can experiment with the taper while it is considerably oversize until he gets it right. The same technique can also be used by grinding machine operators who have to grind gauges for one-off taper hole jobs.

Greater safety for handling bar stock

by **Bradley Laughton**

A bundle of bar stock is usually handled by looping a chain around its approximate center of gravity. Such a practice is not entirely safe as the center of gravity can shift rapidly as one of the bars may start slipping due to a too sudden move by the crane operator or because of bumping the load accidentally against an obstacle.

To overcome such safety hazards some shops have switched to a bundle lifting device as shown here. An I-beam of sufficient strength for the intended maximum load is fitted with two chains. These chains are permanently fastened to the



extreme ends of the beam and their end hooks are hooked into slotted plates that are welded to the underside of the beam near its center. The two chains provide a rather large spread of support and the loads are not subject to being upset easily. A further safety feature is the fact that the hole for the crane hook is rather high above the beam. By increasing this height as much as possible (within practical limits) the load will be handled more safely, as a shift of the center of gravity of the load will not change the slant of the beam as much.

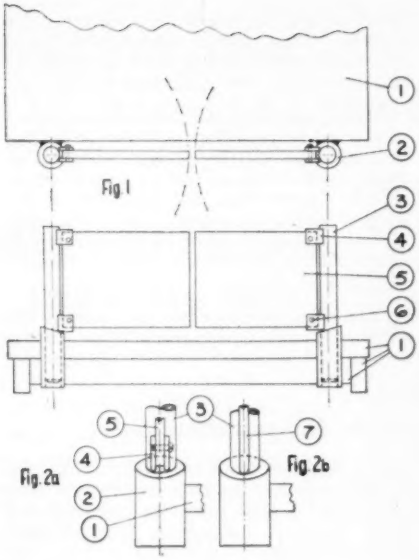
Splash shield with closing feature

by **John Rogers**

To prevent splashing of the machine operator by coolant and metal chips we have provided some of our milling and boring fixtures with self-closing splash shields. These shields can be made transparent by the use of a clear plastic sheet (Acrylics, as f.i. Plexiglas or Lucite) as represented by part (5) of figures 1 and 2a, or it can consist simply of sheet metal, part (7) of Fig. 2b.

Onto the outer edge of the fixture base (1) we welded two drilled and reamed bosses (2) that were milled slanted on their top surfaces. Into the bosses we inserted the two closely fitting shafts (3). Four drilled lugs (4) that are welded to the shafts serve to hold the transparent plastic sheets (5) by means of the screws (6). The lower lugs (4) were rounded off on their bottom edges as shown in Fig. 2a.

When the work piece is ready for removal from the fixture, the piece is pushed thru the splash shields which swing outward upon contact thereby forcing lugs (4) upward on the slanted bosses (2). Gravity will then swing the



guards back again after the piece is removed as the lugs will seat themselves at the lowest point of the bosses.

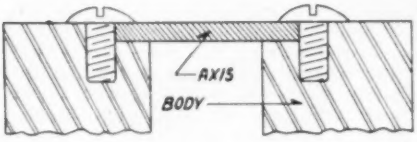
The lugs can be eliminated if sheet metal is substituted for the plastic guards as the metal (7) can be welded to the shafts (3) directly as shown in Fig. 2b. The lower edges of the guards should also be rounded to reduce resistance to rotation.

When the work is inserted into the fixture, the guards will then swing in the opposite direction and again return to their original positions.

Modelmaker's aid

by **Federico Strasser**

Modelmakers sometimes have difficulty in fixing an axis or other part of a gadget or model. The drawing illustrates a simple and efficient method for solving this problem. The axis is put in an opportunely prepared slot and firmly held there by means of the heads of screws (stovebolts).



Chamfering guide

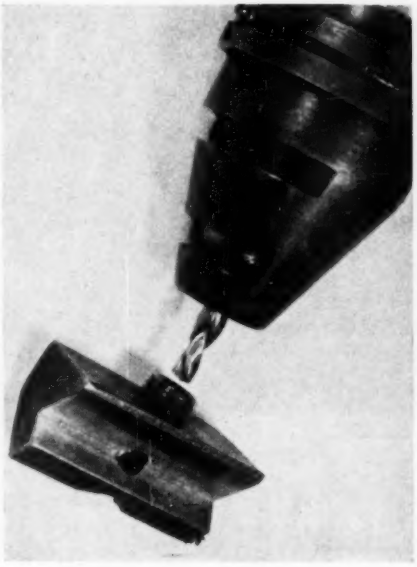
Temco Aircraft Corporation has adapted its ½-inch air routers for chamfering by adding a 1" x 2" notched steel guide to the ends of the routers.

These guides are expected to save $3,000 annually in manhours that normally would be spent hand-filing chamfers on certain aircraft parts.

Billy Childress, general assembly leadman, developed the chamfer guide for use on any standard Quackenbush or Onsrud router. His guides are designed to route a 45-degree chamfer.

To get the desired angle, he milled a 90-degree triangle notch in one side of the guide block. The notch is at 45 degrees to the router blade which passes through a hole bored in the center of the block. The blade is exposed where it intersects the point of the triangle notch.

The hole that encloses the blade is threaded at one end so it can be screwed on the end of the router.



By pressing the notch snugly against the edge to be chamfered, the operator is assured a quick and uniform cut.

Notches can be cut to provide any chamfer angle, and depth of chamfer is controlled by the degree to which the router blade is exposed at the point of the notch.

Holding work

by **W. E. Warner**

Round work or work which must not be marked can be held as shown in the accompanying sketch.

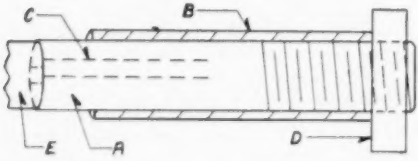


Figure A shows a piece of pipe about six inches long. It is threaded at one end, while at the other end are four hack saw cuts which enable the end (E) to be slightly opened out, and into which the work is placed. Figure B is a sleeve which slides along figure A when the unt, figure D, is screwed up. The sleeves move along A causing the mount, figure E, to up and grip the work.

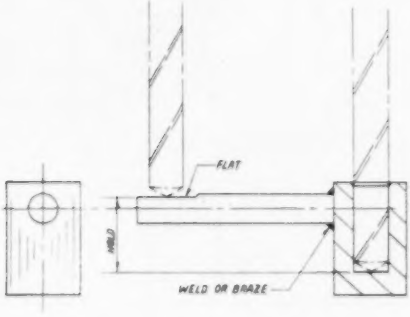
Simple gage sets drills to depth

by **Roger Isotts**

Frequently, on multiple spindle drill heads the holes to be drilled must be held to a specific depth. In such cases the operator must spend considerable time and effort in setting his drills after sharpening or when inserting new drills.

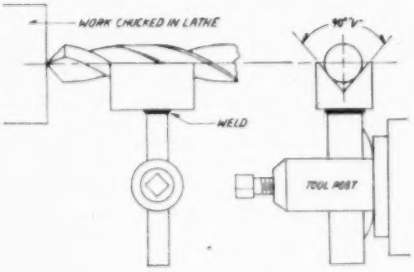
The accompanying illustration shows a simply made gage that will eliminate this time-consuming job. A round section of cold-rolled is bored out to a few thousandths larger than the diameter of the longest drill. A round piece of cold-rolled is brazed or welded to the O.D. and a flat is milled the correct distance of the drill step.

Then, the operator merely places the gage on one drill, and adjusts the shorter one until it contacts the flat on the rod.



Simple drill supporting tool

It is common practice, when drilling in an engine lathe, for the machinist to brace or support a drill with the reversed end of a common toolholder. The purpose of this support is, of course, to keep the drill from drifting off true center or from vibrating. This method is not at all



perfect because as the drill is fed into the work the point of support has to be changed constantly due to the interruption of support surface caused by the helical flute of the drill.

The illustrated "V" support is a simple device and is a very fine guiding device if the "V" notched block is made long enough to span a distance, from margin to margin, across one flute of the drill. The "V" tool should be seated on the drill snugly after the drill is started in the work and then the tool post binding screw is pulled up fully tight.

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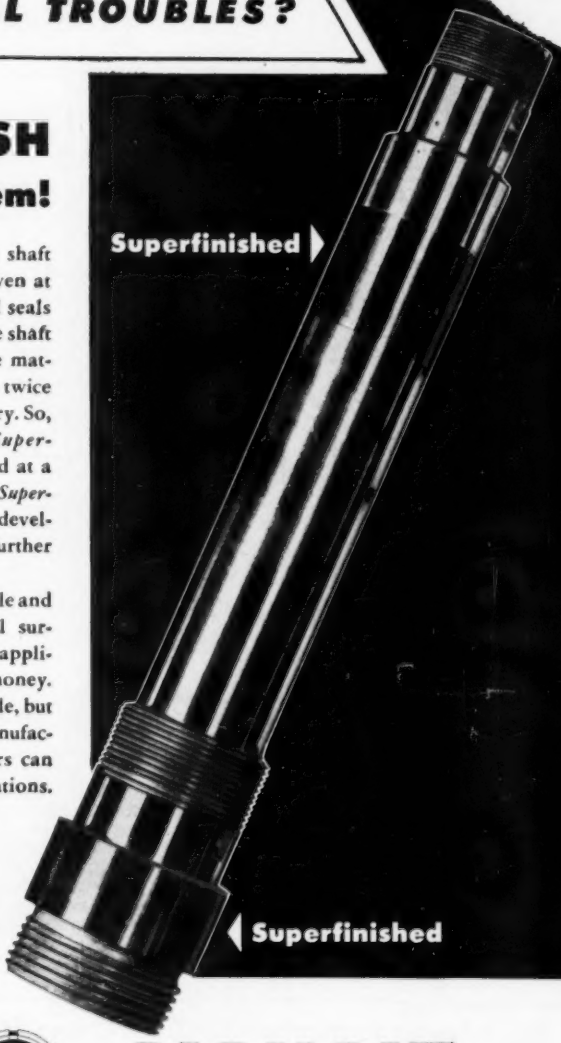

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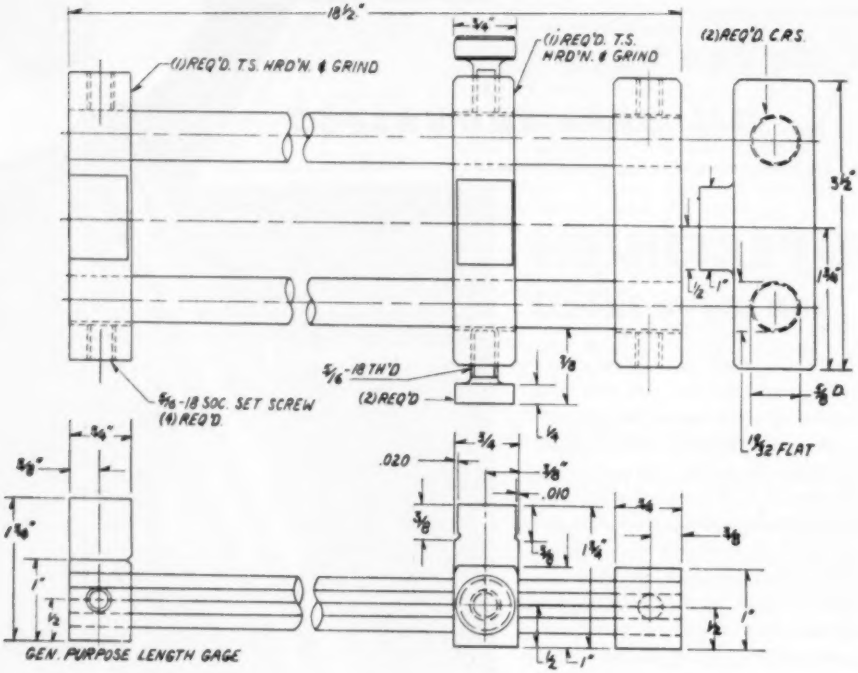

Length gage saves time

by **Harold D. Rhodenbaugh**

The gaging of lengths of shafts, bar stock, tubes or sheet metal strips in production often is a time-consuming operation as well as an awkward one. This is especially true when the parts are longer than six inches.

In many shops operators or inspectors can be seen holding a shaft in one hand while trying to gage its length with a Vernier caliper in the other. It takes time and if high production is required, the possibility of error is increased.

Figure 1 shows a general purpose length gage that is practical, easy to make, and is a time-saver. This gage can be set accurately with Vernier calipers and locked into position in a few moments. It is ideal for production because its sturdy construction will withstand considerable abuse. The operator does not pick this gage up to check a part. He uses both hands to feel the part into the gage, thus minimizing the possibility of error and time to gage the part. And above all, this gage reduces the hazard of the delicate and costly application of Vernier calipers.

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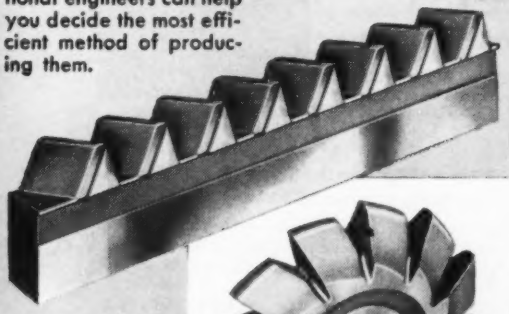
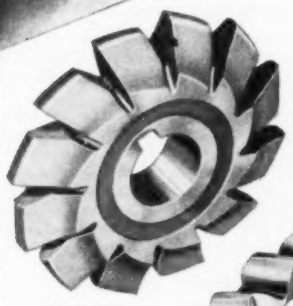
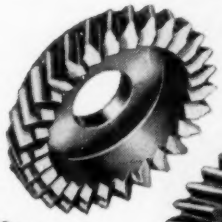


Rack Type Gear Shaper Cutters



Involute Gear Cutters



Gear Shaper Cutters

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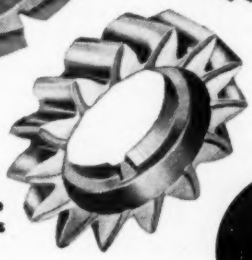

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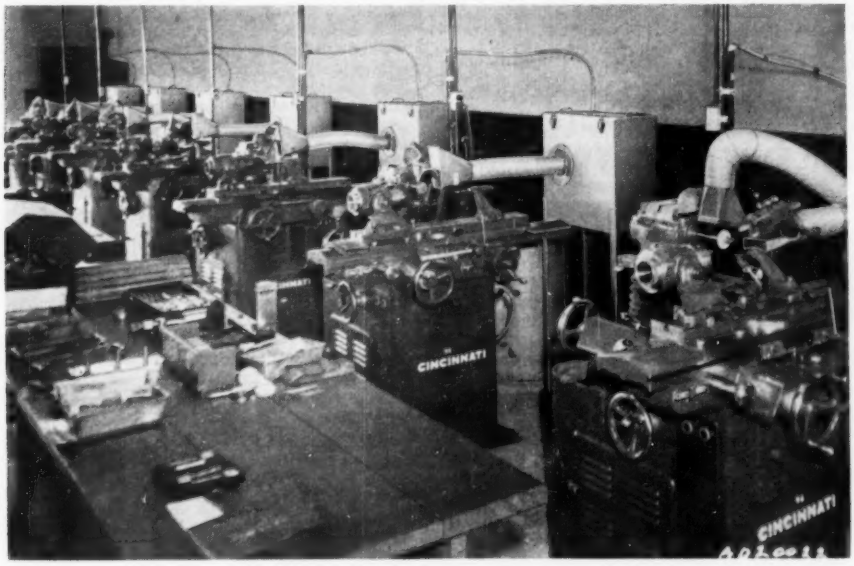
Precision tap maker chooses unit dust collectors over central system for seven universal grinders

Because the selection of dust control equipment may be made by an owner of a small shop or the management of a large plant only once in a lifetime it is sometimes approached with reluctance. It is manifestly impractical for the individual owner or many plant managements to become thoroughly familiar with dust control theory and practice to know that the selection of equipment is often a very simple, very non-technical operation.

An example of this is the installation of collectors to collect the dust from seven

Producer of precision custom made taps selects seven Model 520 Dustkop dust collectors to collect the dust from these seven Cincinnati universal grinders rather than a single collector for entire lot. Extremely intermittent use of grinders, with the savings in installation time and subsequent operating power prompted this selection.



Cincinnati grinders in the shop of a leading producer of precision taps. The management of this shop refers to itself as a "job-shop" in that it welcomes orders for special taps in lots of one or two taps as well as in the larger production lots. This means that the use of the seven grinders is on a strictly intermittent basis with the total usage throughout the day being completely unpredictable. Yet these grinders were installed in a row along one wall of the shop which made it appear at a glance that all could be tied into a single system.

The single system collector which would handle all seven grinders was available from the same dust control manufacturer that could also offer individual one-per-grinder unit type collectors. Moreover, the single collector was available as a standard stock pre-tested unit, the same as the small unit-type collectors. The problem was quickly broken down into its essential elements somewhat as follows:

The amount of air required right at the source of dust totaled about 3,000 cfm. Since the plant is located in the far northern zone where low winter temperatures prevail over a longer period of the year, it was mandatory that the cleaned air be returned to the interior of the shop rather than wasted to the out-of-doors.

Because of the location and also to avoid interfering with current production, the customer decided that his own maintenance department would install whichever system was decided on.

The centralized system

One single self-contained dust collector with cyclone separator and second stage filter to permit return of the cleaned air to the working space would be installed at the end of the row of grinders. A conventional header pipe would connect to the inlet of the collector and have branches and vertical droppers to connect with the hood at each grinder. The vertical dropper has a decided advantage when the universal feature of this type of grinder is being used as it permits the hood to follow the positioning of the grinding wheel to any position. In the present instance, however, the universal feature of the grinder would never be used—the grinding would all be done in one position. Thus the vertical connection had no advantage over a horizontal pipe.

The removal of the collected dust, the regular shakedown of the filter, and renewal of the filter on the collector would depend on the total hours the grinders were in use, but there would be only one collector to maintain. Whereas on the basis of installing one collector per grinder, the maintenance would have to be repeated for all seven collectors. Insofar as installation of the single system was concerned, it would be supplied with installation drawing and all parts would bear a number to correspond with the part, thereby permitting the assembly of the piping and the installation of the entire system to be done quickly by unskilled workers.

The advantage of seven separate collectors

The unit "one-per-grinder," type of collector is likewise entirely self-contained in that each has its own cyclone separator and second stage filter to permit return of the cleaned air to the shop. Installation would consist of moving the collector into position behind each grinder and fastening a short section of connecting hose—with its hood—to the inlet of the collector. By putting the collectors on stands, the surface friction losses would be reduced to virtually nothing. The collectors could be installed with the least interruption to normal operations.

Maintenance of the unit collectors—shakedown of the filters and removal of the dust—appeared to loom large until it was agreed that each grinder operator would give his collector a "morning shakedown" before starting the grinder. The collectors would be installed on stands; this would somewhat facilitate removal of the collected dust from each unit.

The decision in favor of the unit type collectors was made, however, chiefly on the point of the intermittent usage of the grinders: If only one single grinder were being used, the 7½ hp motor of the single collector would be running. But in the case of the individual collectors only a 1/3 hp motor would be "on." With all seven grinders in use, the electrical power required would be on the basis of 7½ hp for the single system as compared with 2 1/3 hp for the individual unit type collectors.

The possibility also existed that the arrangement of the grinders might someday be changed, or that more grinders would be added. The cost of the individual unit type collector was only a little above the cost of the single large col-

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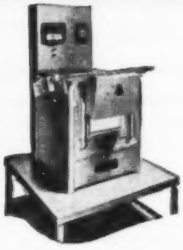

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lector with its overhead piping and branches so the management felt that the advantages were worth the difference.

As it has worked out, the maintenance of the individual collectors has been much easier than was even expected. The "morning shakedown" has become something of a ritual with one operator trying to "outcrank" his neighbor in speed and effect. The life of the filters under this system has been ten months rather than the anticipated six months, and the collectors protect the health of the workers, the precision machinery used in the shop, and also the accuracy of the finished taps.

The unit type collectors finally selected are Model 520 Dustkops rated at about 500 c.f.m. The single large collector which normally would have been used is the Model 3050 Dustkop, and is rated at 3,600 c.f.m. Both collectors are available in their line of industrial dust collectors by Aget-Detroit Co., Dept. B, 205 Main Street, Ann Arbor, Mich.

Multiple tooling in automotive part manufacture

Production of automotive stem pinions with two machines instead of the former three—both of the new machines being easily handled by a single operator—has produced important savings in man-hours and capital investment for a leading automotive manufacturer.

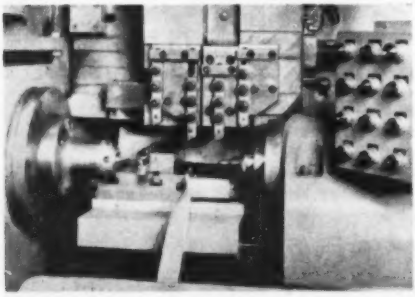
The job is now being done on two of the new Model HD-12 lathes recently announced by Hydra-Feed Machine Tool Corporation, 730 W. Eight Mile Road, Ferndale, Michigan. Part of the greater machining efficiency is traceable to the design of the Hydra-Feed lathes that permits maximum utilization of multiple carbide tooling. Short tool travel to engage the work and during cutting allows the parts to be produced in minimum time. Elimination of front carriage on these machines, the tools being mounted in a top and a rear carriage, enables the parts to be loaded and unloaded more readily by the operator.

Stem pinions are machined from SAE 4620 steel forgings in the annealed state. During the rough turning operation in the first Hydra-Feed lathe, 1¼ pounds of metal are removed in a 22-second cycle. Four tools are used on the top carriage, and one tool is mounted on the rear carriage. Four different diameters are turned by the cam controlled tools on the top carriage and a facing operation is performed by the tool on the rear carriage.

Following completion of the roughing cut, the operator transfers the part to the second machine where ½-pound of metal is removed in an 18-second cycle. Five tools mounted on the top carriage remove most of the metal while six tools in the rear carriage are simultaneously squaring up corners, chamfering and putting in radii.

Use of a hydraulic powered tailstock and carbide driving inserts on the spindle enables the machine to finish turn the head of the part at the same time as cuts are being taken on the stem. The hydraulic tailstock assures perfect alignment and constant contact with the driving inserts throughout the cutting cycle. Pushbutton operation makes loading and unloading of the parts quick and simple.

Picture shows closeup of tooling for rough turning of automotive stem pinion on Hydra-Feed HD-12 automatic lathe. Four tools are used on top carriage and a simple tool on rear carriage leaving front of machine clear for easy handling of parts in process.



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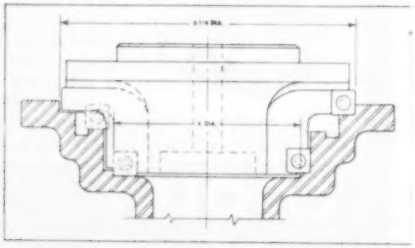

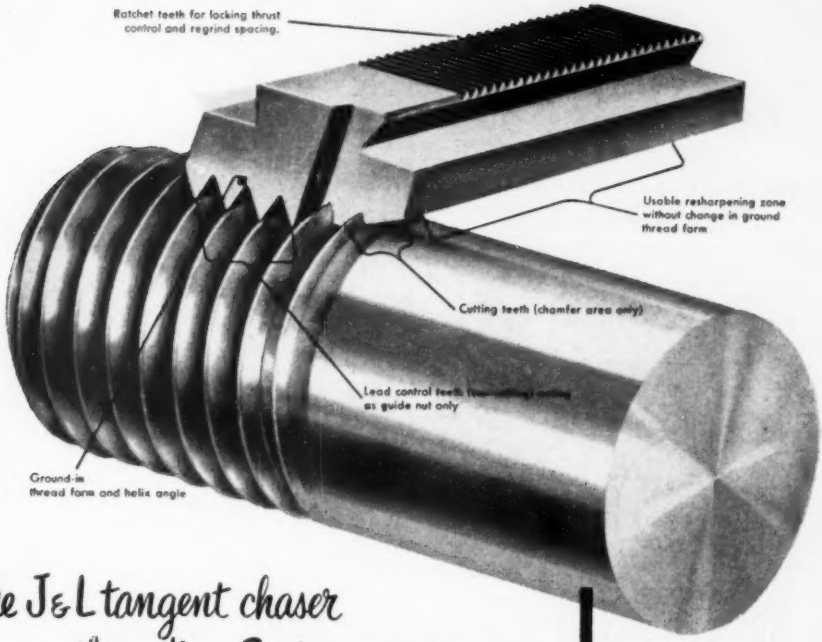
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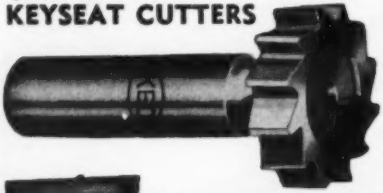

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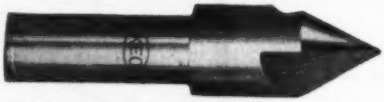

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This operation is done at 0.022-inch feed, 375 surface feet per minute, and ⅛ to ¼-inch depth of cut, on a radial drill press which is equipped with a special guide fixture in contact with bronze wear strips mounted in an arbor directly above the cutter body. The boring head's design permits partial disassembly for easy maintenance.

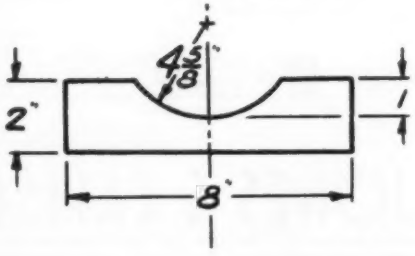
Brazing required 34 hours — under normal conditions a twelve-tip head required reconditioning after a run of approximately 175 pieces. To regrind the brazed boring head and hold all dimensions with a 0.002-inch tolerance required 20 hours. If brazing in new tips was necessary—reconditioning time was 34 hours.

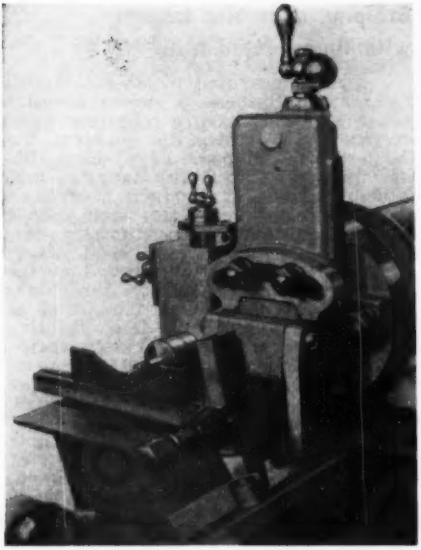
With a Kendex insert head, under similar conditions, regrinding is entirely eliminated. The special boring head has standard Kendex square carbide inserts—eight style SD-8 and four style SD-12, all of Kennametal grade K6. After 175 pieces are machined, the inserts are rotated to a new cutting edge in a matter of minutes. Since four new cutting edges are available on each insert, 700 pieces are machined after which the inserts are economically discarded and replaced.

To produce this number of pieces with the brazed head would have required machine downtime for four regrinds in addition to 80 hours of expensive grinding time.

"Shaper of turnpikes"

The operation time for machining bridge bearing plates in quantity has been reduced from 75 minutes to 20 minutes by the application of a follower equipped Cincinnati Metal Working Shaper, at the Buffalo Plant of Ernst Iron Works.





This machine, illustrated in the accompanying photo, is a 24" heavy duty Cincinnati Shaper, equipped with a Turchan automatic follower. In one 20 minute floor to floor operation, this shaper accurately produces a radial bearing seat that formerly required two setups and two machining operations.

Ernst Iron Works produces many of the bridges and general construction components for the highway turnpikes rapidly spanning the country today.

Use multiple carbides on first cast steel crankshafts

The automotive industry's first cast steel crankshafts were successfully machined recently on Wickes center drive lathes with Wesson Band-Type Multicut holders and Wessonmetal carbide at the Wickes Brothers' plant, Saginaw, Michigan. Initial tests prove that crankshaft production with multiple carbide tooling more than doubles previous methods.

Cast steel cranks which will go into full production on the Wickes-Wesson set up in the near future, are slated for introduction by a major auto-maker in a 1955 model.

Machining of the cast steel crankshafts parallels Wesson's development of the first carbide tooling successfully applied

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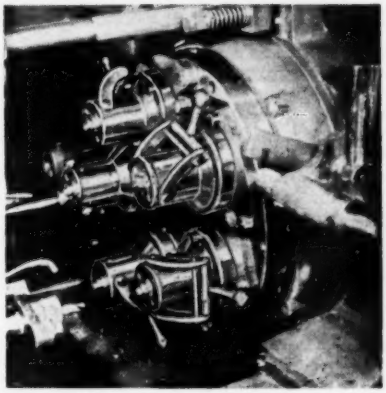

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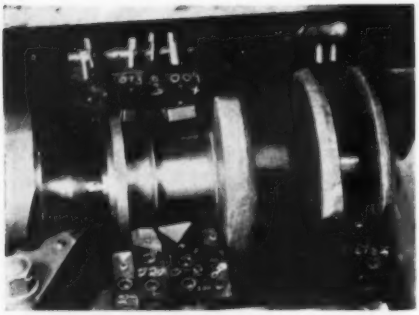


to the industry's first nodular (cast) iron crankshafts several years ago.

However, several major modifications, the result of tool research and crankshaft development, are incorporated in the cast steel set up.

On the nodular iron crank machining operations, 34 tools are required to turn all five main bearings, flange end and stub end while only 25 special Multicuts mounted on two slides are required on present steel crank tooling. A third slide consisting of additional Multicuts is designed to cheek the throws when required on the nodular iron set up. On the steel set up, dual-insert holders which turn the mains and journal fillets are also designed to perform cheeking operations when required.

Because the cast steel crankshaft manufacturer, Auto Specialties Mfg. Co., Inc., of St. Joseph, Michigan, is producing the castings with close precision tolerances it has not been necessary to touch the throws.

The Wickes lathe is equipped to feed hydraulically with automatic control of the work cycle as follows: Rapid traverse in, second (cheeking) feed, intermediate feed and fine finishing feed.

Many cost reducing features such as adjusting screws extending through the blocks making insert adjustment easier and quicker are incorporated into the tool set up.

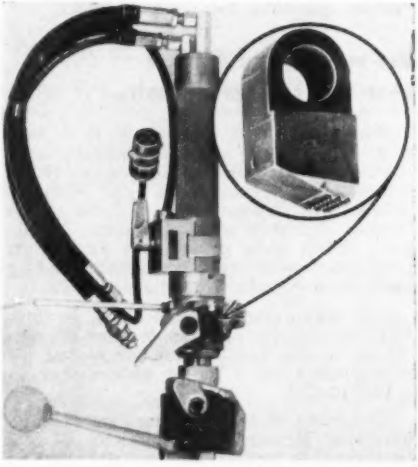
The initial machining operations on the steel cranks were performed with Wessonmetal carbide Grade "M". However, testing of other Wessonmetal carbide grades on the various positions is being conducted prior to putting the cranks into full production.

Accompanying photo shows cast steel crankshaft in position for machining with Wesson band-type Multicut holders and Wessonmetal carbides. A total of 25 Multicut tools is mounted on blocks on the slides.

Gripping dogs bite longer with flame-plated teeth

Gripping dogs used in steel strapping tools are subjected to severe abrasive action and thus have a relatively short service life. To solve this problem, the Acme Steel Company of Chicago, Ill., has this part plated with tungsten carbide by Linde Air Products Company's flame-plating process for their B8A10 Hydraulic Stretcher. The tungsten carbide coating provides a hard, wear-resistant surface while retaining the toughness of the base metal. The result: a wear life two to four times that of unplated gripping dogs, less repairing and replacing of parts, and more satisfied customers. The flame-plated coating is left in as-coated condition (similar to fine emery cloth) for extra gripping power.

Flame-plating was developed by Linde Air Products Company, a division of Union Carbide and Carbon Corporation, for depositing a thin coating of tungsten carbide on the surface of parts and many tools, made of most common metals. Because the temperature of the part being plated does not exceed 400 deg. F., finished or semi-finished parts can be plated without distorting or changing the physical characteristics of the base metal. The coating may be left in as-coated condition (125 microinches rms) or finished down to 1-5 microinches rms for applications requiring precision fits or fine surfaces finishes.



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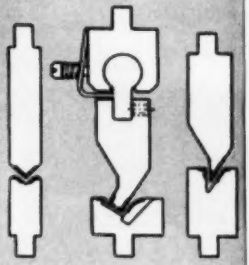

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Carbide Broaching Future Appears Bright

By E. H. Graf and Cass Morawski,
Detroit Brooch Co.
Rochester, Mich.

THE FUTURE appears to be bright as it concerns the use of tungsten carbides in broaching.

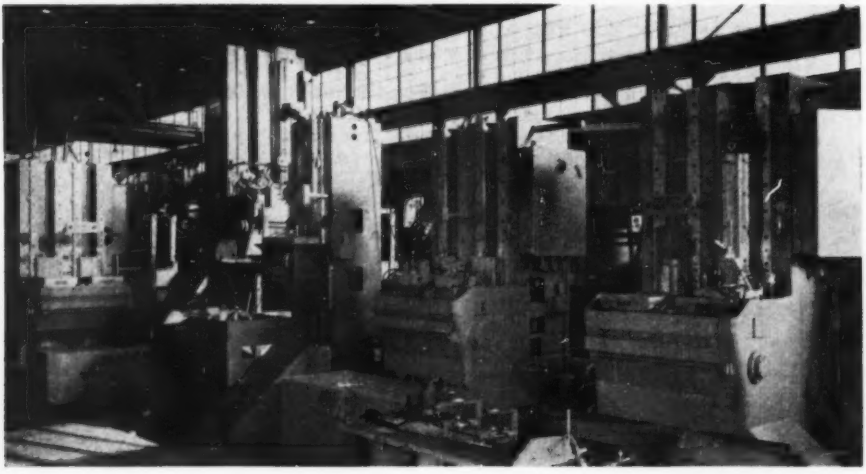
During the last 10 or 15 years the use of carbide in broaching was more or less limited to cast iron and the nonferrous group of materials. Cylinder blocks and cylinder heads, cast carburetors bodies and various aluminum alloy parts were the principal applications, and these applications resulted in much lower broaching cost per piece. Further, the tools generally were simple in design and easily manufactured by most well equipped shops. However, because of the initial expense involved, carbides were at that time used mostly on long run high production jobs where high initial cost could be readily amortized.

It was further noteworthy that low cutting speeds did not seem to materially influence the effectiveness of the carbide tools, although it is only fair to say that no reliable test results were available.

With the passing of the years and the build up in gas turbine production, new materials came into use that, little by little, were refined and changed to such a degree that new types of cutting tools became a problem worthy of considerable thought.

As we know, these gas turbine parts involve form broaches of a complicated nature with very close tolerances making the problem of manufacturing the tools a complex one. Materials such as hard forms of stainless steel and particularly the Stellite No. 31, for all

View of part of the line of broaches made by the Detroit Broach Co.

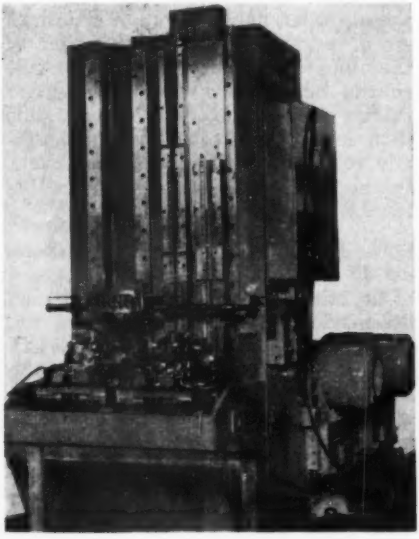


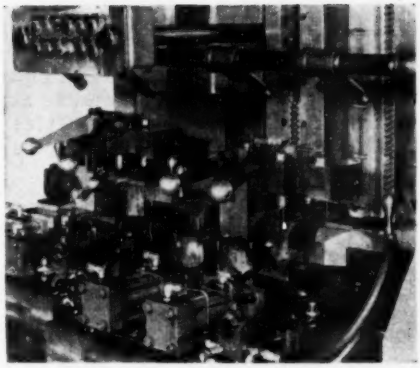
practical purposes, cannot be broached with premium high speed steel tools. Therefore, the departure to carbides becomes a necessity.

During the last year and a half there have been contributing factors which have helped to make carbide broaching more possible on elaborate forms. New designs of the tools themselves open new vistas, new and more rigid broaching machines are now available, and the Elox method of disintegrating carbide have all played their parts in this development.

Detroit Broach Co. Inc., of Rochester, Mich., has for example recently built the first of several new 100" stroke, 15-ton dual ram vertical hydraulic, high speed surface broaching machines for broaching four separate operations on a Stellite No. 31 turbine bucket and has equipped the machine with carbide cutting tools throughout. The machine is extremely rigid and is equipped with fully stabilized tables and slides. Cutting speeds are variable up to 120 strokes per minute with full tonnage available at all speeds.

This is the new 100" stroke, 15-ton dual ram vertical hydraulic, high speed surface broaching machine.



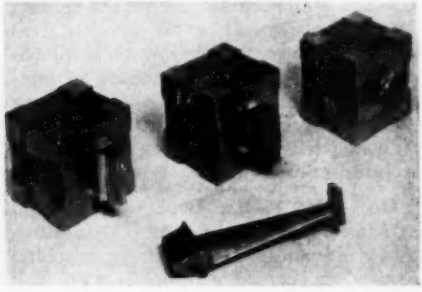


Closeup of the 15-ton machine which is set up for broaching four separate operations on a Stellite No. 31 turbine bucket with carbide cutting tools.

The operations are:

1. Broach the angular ends adjacent to the root form and the end face at right angles to them.
2. Broach the Christmas tree root.
3. Broach angular sides of shroud end.
4. Broach other angular sides of shroud end.

Three stages of the broaching operation on the Christmas tree are shown in the holding fixtures. The finished piece is shown in the foreground.



These tools are of a more-or-less conventional type. Bodies are made into which the carbide is brazed. Hook and back off angles are much the same as in high speed steel tools. The carbide itself is a tough grade minimizing the tendency to chip and crack.

As we are able to grind better finishes in carbide, and provide greater rigidity in the setup, our results will improve materially.

Many questions at this point remain unanswered. Among them are:

What cutting speeds are most efficient?

What effect will radical tool design changes have?

What results can be attributed to greater rigidity in not only the tools themselves, but in the machine construction as well?

What effect will accurately preloaded machine slides and tables have?

So far it would seem that all these factors and many more have a decided bearing.

Carbide tools of this nature are neither easily nor cheaply manufactured at this time. However, new and simplified design and improved manufacturing ideas hold great promise for the future.

It would be well for manufacturers of various components to review their tooling. New ideas are rapidly becoming a reality and it is our belief that carbides as applied to broaching are coming into their own. It seems incidental at this moment to place too much emphasis on cutting speed as a measure of successful operation. More importantly we concern ourselves with better tool design and better manufacturing methods in building the tool.

Our new 15-ton twin ram vertical surface broaching machine features many advances in broaching machine design. It comes equipped with full automatic, semi-automatic and manual controls, plus an emergency stop. Any of the three types of operations can be selected at will. Although the standard range of cutting speeds is between four and thirty feet per minute, higher speeds can be supplied when required. Total broaching force is delivered at any speed in the machine's range and peak capacity is 50 per cent greater than rated capacity.

One of the claims for this machine is the fact that the main slides operate within .0005" throughout the entire 100" stroke. The main slide travels in square box ways which are accurately fitted, hardened and ground steel ways with full tapered gibb adjustment. The slides are also fully preloaded against one true surface and provided with special force-feed lubrication. In addition, piston rods which power the slides are in tension during the broaching stroke (not in compression) which provides a smoother cutting action.

We have added another inovation on this machine. Should the rams settle overnight, they automatically return to the top when the start button is pushed. As a result there is never danger of the rams being out of time with the shuttle tables. Also, should a heavier cutting load be exerted on one slide than on the other, the slides automatically equalize at the end of each cycle. In this manner it is almost impossible for the machine to get out of time.

The knee of this machine is independently powered. As a result, the speed of the shuttle tables can be established independently from the speed of the slides. Thus, shuttle tables operate at the desirable speed even when the slides are operating at the highest speed. When the shuttle tables reach broaching position they are positively locked in position.

Shuttle tables also travel in accurately-fitted, box-type hardened and ground

steel ways and are preloaded against one true surface. They are lubricated by special forced feed. For independent "in and out" adjustment, each shuttle table is arranged with a standard dovetail table slide.

We use oil gear fluid power equipment throughout this machine and all piping is bent, brazed and braced. All connections are flange type with dead-soft annealed copper gaskets to minimize leakage. J.I.C. standards are observed throughout. Power units are arranged so that they may be located at floor level or in the pit. In this manner, the power unit can be mounted in the location most convenient for maintenance when required. Approximate weight of the complete unit is 38,500 pounds.

All vertical machines with five, ten, fifteen and twenty-five ton capacities will have 42, 54, 66, and 90-inch stroke. The 35-ton capacity machine has a 54, 66, and 90-inch stroke.

On horizontal machines, the following sizes can be supplied:

Capacity 3 and 6 ton, 36" and 48" stroke; 10 ton, 54" stroke; 15 ton, 64" stroke; 25 and 35 ton, 72" stroke.

These are the specifications for the 15-ton, 100" stroke dual ram vertical surface broaching machine.

1. Normal capacity—30,800 pounds.
2. Maximum capacity—46,200 pounds.
3. Cutting speed variable from 8 to 120 fpm.
4. Adjustable stroke of 12 to 100 inches.
5. Tables are 20 inches front to back and 22 inches left to right.
6. Equipped with (2) DX-6011 Oilgear pumps with oil reservoir capacity of 270 gallons.
7. Machine has the preloaded slide feature and adjustable dovetail tables.
8. Machine is tooled for broaching four operations on turbine blades utilizing carbide tipped broach inserts, and the part being held in hydraulically operated two station fixtures.

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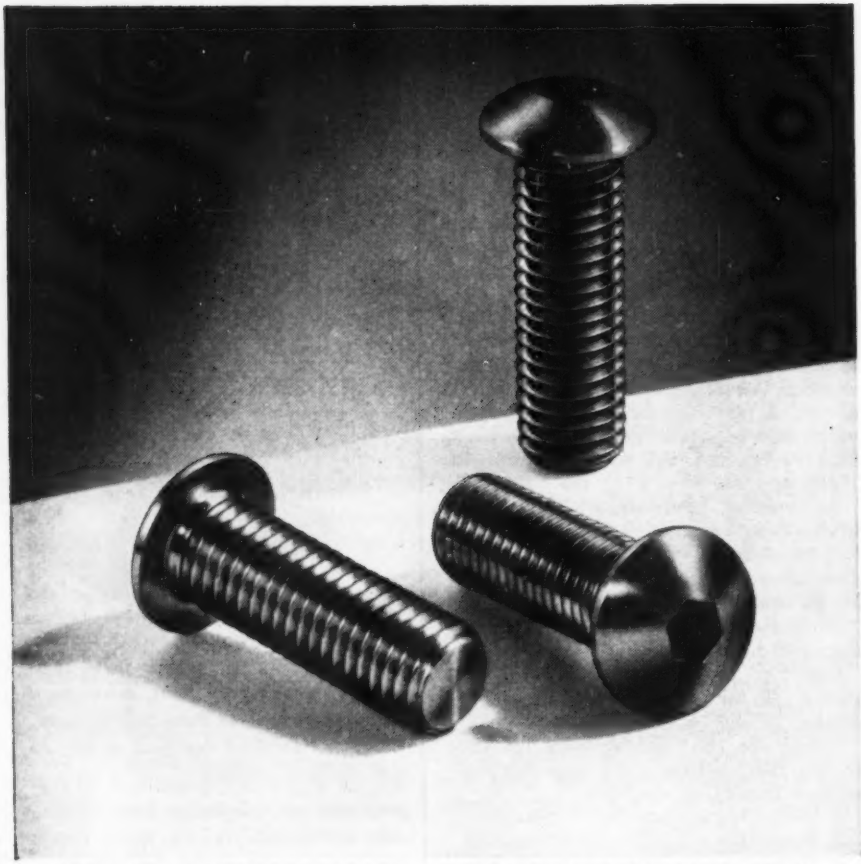

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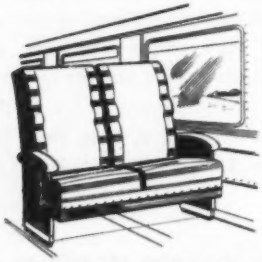

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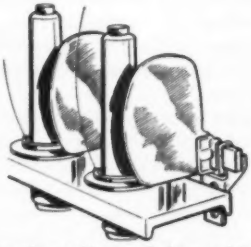

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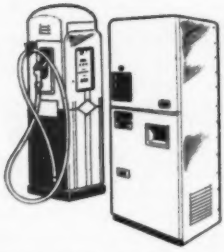

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Foremanship Forum

Management Communicates Ideas Through the Spoken Word

By **George Allison**

IT MIGHT be interesting to listen closely to the language used by foremen and supervisors in their directing of workers. And, another look at their written reports might prove worth while.

Many companies fail to understand that it is their responsibility to communicate ideas through easily-understood English and properly worded reports and orders. These companies could do well to teach their management team of supervisors and foremen, and sometimes even top-level management, the proper use of the English language in speech and writing. Some of the most simple orders go haywire because they have been misinterpreted by mishandled language.

Many foremen, who are walking encyclopedias of shop information, stumble and become complete blanks when it comes to expressing themselves before their workers or in submitting a written report to their superiors. This situation can be eliminated by sending these men back to school for refresher courses in English and composition. It is these men who hold the key responsibility in passing down the line management's orders and ideas.

The spoken word today is more important than ever before. Foremen and supervisors who are effective leaders are generally found to be effective speakers. Orders, instructions, explanations, requests and written reports by men using easily understood English is the secret of a great part of their success. Proper use of the English language in this country is the basis of effective speaking.

These questions should be considered before submitting a report or communicating an idea or an order to workers:

1. What do you want to say?
2. Who are your listeners?
3. What is the situation?
4. What do you know about the idea, problem or order?

The foreman who shows respect for the person to whom he is speaking and who thinks before he speaks is more than likely to be effective in handling people in his department.

In developing the ability to speak effectively, either to a group or to one person, these factors need to be kept in mind: proper use of the English language; the situation, or the occasion.

The situation in which a foreman is speaking to one person or a group in-

volves several factors. Do the listeners need what the speaker has to offer them?

Hundreds of people have spent countless years studying salesmanship, in developing sales training programs, in discovering sales appeals, in building result getting sales talks. The result of all this effort is that we know that each "sale" by a salesman is in reality a "purchase" by a customer. In presenting your ideas to your listener you are "making a sale," and he is actually "buying" what you have to offer.

To get your ideas and orders across to your men, it should be stated in such a way as to appear that it will help them in some way. However, it should not be a plea, or in a coaxing or begging manner. Orders from foremen and supervisors, which are (1) brief, (2) simple, (3) and easily understood should

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be persuasive enough to put across the communication.

The most important single thing which we can learn to apply is to see things from the viewpoint of the other fellow. For the foreman, supervisor or leadman, this means seeing things from the standpoint of the listeners, whether they be top management, workers or other supervisors. The more information known about the listener, and about the occasion or situation, the easier it will be to put an idea across.

As far as the occasion itself is concerned, there are four basic considerations which may affect how you say what you have to say.

First, the purpose of the talk or speech. Your remarks should make some definite and appropriate contribution towards that general purpose.

Second, the prevailing rules, customs,

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and procedures of the situation must be taken into account. It may very well be that you transgress some rule of procedure or habit of your listeners, which will not only be embarrassing to you, but may very well undermine the success of your message. Find out before hand what the customs and procedures are amongst your listeners.

Third, the events which occur immediately before and immediately after what you have to say have a vital effect upon the success with which your ideas are put over. If the situation is a meeting of foremen or workers or some other groups with a common purpose, it will probably follow some definite program. What you have to say and how you say it must be appropriate to the occasion, and must overcome whatever handicaps of atmosphere are created by the other happenings on the

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program. If you are speaking to a single individual, it is possible that your listener might just have had a very great disappointment or might have had an argument with someone that left him all hot and bothered. He may be in no mood to listen to you. Find out before you speak. If he listens to you, then goes off to his job and some other incident occurs which will make him forget what you have said or change his mind about accepting your suggestions, see if you can anticipate what might happen after you have talked to him.

Fourth, the physical condition of the place in which you speak. If it is a group meeting, the size and the shape of the room or hall, the presence or absence of a public address system, the comfort or lack of comfort of the chairs, the temperature or ventilation in the room, the lighting in the place, are all

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Single eccentric type for equally spaced holes on bolt circles
Universal joint with slip spindle fixed locating plate
Double eccentric type for irregular spacing
Write for details on any type of universal joint adjustable head. Ask also about our totally enclosed gear-driven adjustable, fixed center, or individual lead screw tapping heads.
UNITED STATES DRILL HEAD COMPANY
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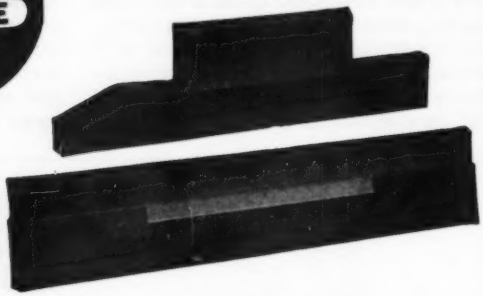
WILLEY'S
TUNGSTEN CARBIDE
TOOLS

CARBIDE TIPPED
Work Support Blades
for CENTERLESS GRINDERS

Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints.



SPECIAL TOOLS — Prompt quotes on receipt of prints

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
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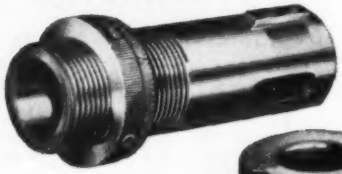
For Unvarying ACCURACY...

Standardize on ECONOMY
"TRU-LOC"
Adjustable Adapters & Nut

- **CONCENTRIC**
- **GROUND ACME THREADED BODY**
- **"TRU-LOC" NUT — Lock in Any Position**
- **WOODRUFF KEYWAY — Relieved**

All items in stock — immediate delivery assured. Write for latest Bulletin and Price List.



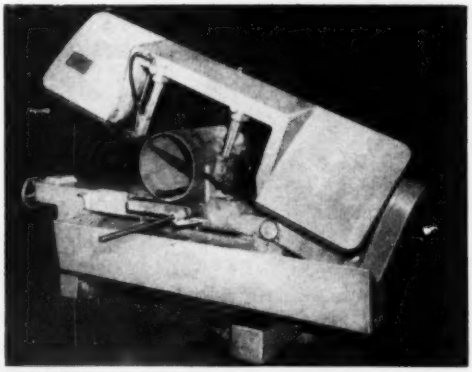
Economy
"TRU-LOC" Adapter Sleeves
A.S.A. Drill Jig Bushings
A.G.D. Plug & Ring Gages

Economy — **TOOL & MACHINE CO.**
1824 S. 68th St. • Milwaukee 14, Wis.

factors which influence attention and the success of your message. If in speaking to one person you have a quiet, comfortable room where you can talk and smoke and be undisturbed, that is one thing. If you have to grab a worker when he has a free moment out in the shop where people are passing by and a punch press is banging away six feet from where you are standing, that is something else. Try to bear these physical conditions in mind in preparing yourself to get across your ideas.

Apart from the vital interests and basic desires of your audience, there is a good deal of additional information about your listeners which is useful in making your remarks effective. Assuming that you have already determined what their basic interests are, and how you shall appeal to them, there are six other points of information which will

MODEL 1220



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big, rugged, built for heavier production

MODEL 8C
Cuts 8" round, 16" flat, 8" pipe.

MODEL 610
Cuts 6" round, 10" flat.

KALAMATIC AUTOMATIC BAR FEED ATTACHMENT for Kalamazoo Metal Cutting Band Saws.

Cuts 12" round, 20" flat stock. Accurate to thousandths of an inch, minimum burr and kerf. Four cutting speeds, four blade-tension adjustments for better sawing, longer blade life. Safety-designed throughout—only cutting section of saw blade is exposed. Positive power from heavy duty 1 HP motor. Available with coolant equipment.
Ask your dealer for details and demonstration.

MACHINE TOOL DIVISION

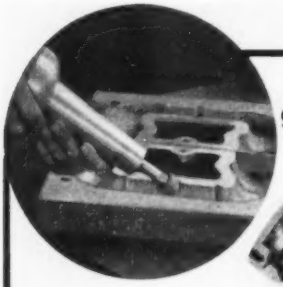
Kalamazoo TANK and SILO CO.

1232 HARRISON ST., KALAMAZOO, MICHIGAN

be useful to you.

(1) The general information as to the number of people to whom you intend to speak, their sex, age, occupation, education, job experience, outside experience in life, their religious or social ideas and beliefs, their membership in various groups or clubs or leagues. All of this is an index of their potential ability to understand and appreciate what you have to say to them, and it is also a good check on your previous analysis of their basic interests and desires.

(2) The amount of knowledge your listener or listeners have on your subject. You would hardly give an elementary explanation of the principles of a drill press to an experienced machinist; yet if you were speaking to a new worker about the shortage of tools and the need to be careful and not break



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for faster, easier grinding

Onsrud Air Turbine Grinders give speeds up to 75,000 RPM, with ample power to hold rated speed under full load. No slow-up to wear out wheels and patience. High speed lets you use small, lower cost wheels. Air turbine motors always run cool. Light in weight. Grease packed bearings save time on tool maintenance. For information, write for Grinder Bulletin 1129.

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YOUR CHOICE OF THREE DIFFERENT SIZES

B-1B AIR TURBINE GRINDER 75,000 RPM

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E-1A AIR TURBINE GRINDER 38,000 RPM

Onsrud® **America's leading AIR TURBINE TOOLS**

new variable vane feature

adds more advantages to NORGREN

micro-fog lubricators

for air tools and cylinders

meet a broader range of operating conditions...each can handle jobs now done by several sizes of lubricators

¼" . . .. 5 to 40 cfm
⅜" & ½" . . . . 5 to 100 cfm
¾" & 1" . . . . 5 to 250 cfm

simple adjustment inside the dome of the lubricator provides wide range of air flow for varying conditions or different applications, which previously required several lubricators. For instance, at 80 psi. the ⅜" size can be easily set for a low flow range of 5 to 9 cfm or up to a high flow range of 50 to 100 cfm, or any comparable intermediate range. Transparent bowl (½ pt.) or tank types (1¾ or 4½ gal.)

OTHER EXCLUSIVE FEATURES OF NORGREN MICRO-FOG LUBRICATORS

360° visibility of both the oil feed and oil supply ...no guess work.

oil feed controlled by auxiliary air circuit ...gives an accurate and uniform rate of oil feed.

constant oil level ...rate of oil feed not affected by oil supply.

(Available in all types but not shown here)

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3438 So. Elati, Englewood, Colo.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

VALVES • FILTERS • REGULATORS • LUBRICATORS • HOSE ASSEMBLIES

tools if possible, some explanation of the source of those tools, the difficulties of their manufacture might be in order.

(3) The fixed attitudes and beliefs of your audience need to be considered. Their fund of knowledge and understanding of the problem might be very slight and considerably erroneous, but they can very well have fixed and firm prejudices on the matter, or on economic or social or religious or political matters which will render almost useless any amount of careful explanation on your part. Very often, if the proved facts run contrary to their established beliefs, the facts are rejected because "It ain't so."

(4) The listeners' attitude towards the speaker. This has two aspects: the attitude of more or less friendliness or animosity towards the speaker as an individual person, and also the relative

"IN-STOCK" SERVICE ON FAMOUS SPHINX BRAND MICRO-DRILLS

High speed drills for small holes. Sizes from .08 mm (.003") to 1.0 mm (.040") carried in stock, in increments of .01 mm (.0004").

Sphinx brand micro-drills used throughout the world for many years for all fine watch and instrument work.

Send for Bulletin N listing sizes and prices of stock drill sizes and micro-drilling equipment.

These precision drills are available in two styles, flat pivot drills or spiral fluted drills. They are made with concentric oversize shanks. Because of their rigidity they are especially useful in all types of drilling equipment.

LEVIN ®

Louis Levin & Son, Inc.

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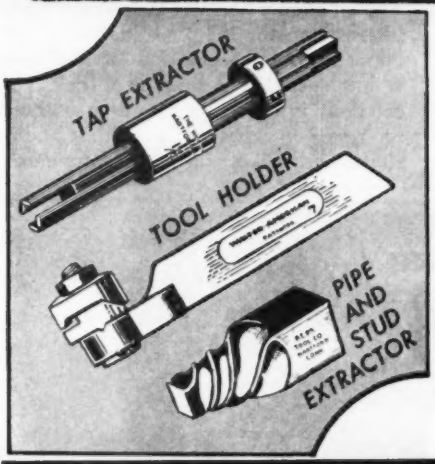
WALTON *SPECIALIZED* TOOLS CUT COSTS IN METAL WORKING



SAVE TIME AND LABOR

When the broken pieces of taps, screws, studs, and pipes resist all ordinary methods of removal, **Walton Specialized Extractor Too's** will greatly aid you in keeping production moving. Especially designed for this job, these tools reduce excessive costs through savings in labor and parts salvaged. **Always have them at hand in your tool crib.**

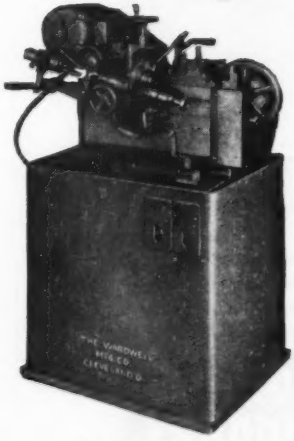
Walton-American Tool Ho'ders are also "labor savers." Four sizes will handle all tool bits and boring bars from 1/8" to 7/16", each size adjustable to eight straight, right offset, or left offset positions. **Try a set in your shop at our expense.**

Write for Walton Tools Catalog No. 12. Liberal free trial offer on all tools. Sold by leading industrial supply dealers.

THE WALTON COMPANY, Hartford 10, Conn.

Sharpens Taps, Saws

grinds straight flutes



A versatile straight flute grinder that will:

a) Sharpen taps
b) Sharpen Saws in Gangs
c) Sharpen Reamers
d) Grinds straight flutes from solid
e) Spiral points
f) Sharpen milling cutters, Woodruff key cutters

Automatically indexes, no special skill needed!

Write for bulletin on 50F Automatic Universal Flute Grinder

WARDWELL MANUFACTURING CO.
3807 Ridge Rd., Cleveland 9, Ohio

Maker of Largest Line of Saw and Tool Sharpening Machines

degree of their respect for his ability or knowledge of his subject. It often happens that a man who is personally disliked can put over his ideas effectively simply because his listeners have a great respect for his knowledge and ability.

(5) The listeners' attitude towards the subject itself. This simply means that they are either interested in the problem before they begin to listen to you, or that they are more or less apathetic or disinterested. In some instances they will listen to a man about whom they have no particular knowledge or for whom they have no particular liking or respect simply because the subject itself interests them. In other instances, the importance or reputation of the man who is speaking to them is sufficient to get their interest and attention without reference to what he is talking about. However, unless they are previously

RELY ON Morton FIXTURE CLAMPS and COMPONENTS
BACKED BY 30 YEARS OF FINE TOOL MAKING
Immediate Delivery on STANDARDS!
Standards can be modified to suit your application.
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4
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For instructive, illustrated Catalog containing full size tracing templates of each product.
MORTON MACHINE WORKS
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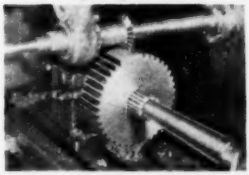
interested in the subject, it is your job in speaking to them to get them interested and this is done simply by relating the subject to their basic wants and desires.

(6) The attitude of the listeners towards the speaker's purpose. Suppose the speaker were to tell the listeners in the first sentence what his purpose was in speaking to them. What would their reaction be? Probably not what the speaker had hoped it would be by the time he had concluded his remarks. The point is, by asking this question before approaching the listeners, the speaker can adapt his remarks to obtain the reaction wanted by the time he is finished speaking.

As far as listener reaction while you are speaking is concerned, no fixed rule can be laid down. If you are speaking to a group, it is entirely possible to find

This faster—simpler expanding mandrel speeds production on all types of operation. Sleeve provides maximum bearing surface for positive holding of work without distortion or marring.

Typical precision operations using "K-O" Expanding Mandrels



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that you have been mistaken in your analysis of the group, and that you must adjust your remarks and correct this while you speak by establishing a common ground of interest with your listeners. If you are visiting with one person the task is easier, as you have an opportunity to question your listener and get an informative answer, gradually giving you a chance to work out between you a large area of agreement on the subject so that your task in persuading him to accept your ideas is greatly diminished.

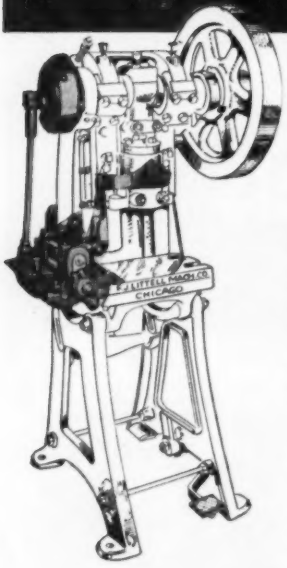
Foremen, who today are confronted with the great problem of dealing with people, will find that they can more easily say the right thing at the right time if they will consider the basic factors in the situation before speaking.

The End

Automation in Action . . .

LITTELL Style "M" ROLL FEED

Makes Any Punch Press Fully Automatic—and 3 Ways Better



- **FASTER** . . . 9,000 stampings an hour at 200 strokes per minute, or 4500 stampings an hour at 100 strokes per minute are easy production rates on any press with Style "M" Roll Feed.
- **SAFER** . . . Automatic feeding with Style "M" Roll Feed keeps hands and fingers safe from costly accidents.
- **LOWER IN COST** . . . Faster, automatic production from low cost coil stock cuts cost per stamping. Greater safety gives your presses the lowest insurance rate.

The Style "M" Roll Feed is quickly and easily installed on any standard punch press. Several models are available—the largest feeds coil stock up to 8" wide and .055" thick. All models feed left to right, right to left or front to back. Feed direction is reversed by reversing the clutch. On large models, feed length per stroke is from 0 to 4⅜" with standard gears, and from 0 to 8½" with compound gears. Feeding rolls are hardened and ground for long service life. Style "M" puts automation in your press room at lowest possible cost.

Write for the Littell Roll Feed Catalog

F. J. LITTELL MACHINE CO.

Speed with Safety

ROLL FEEDS • DIAL FEEDS
STRAIGHTENING MACHINES
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District Offices: Detroit, Cleveland

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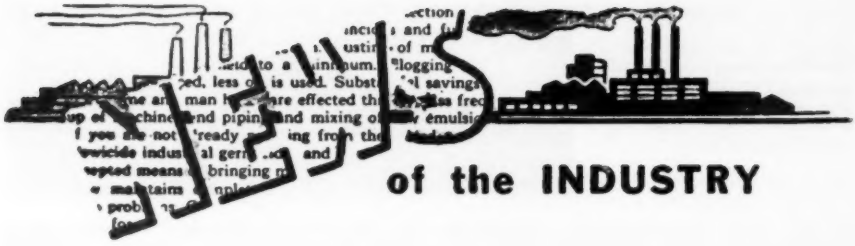


Cincinnati Milling Marks 70th Anniversary

The Cincinnati Milling Machine Co. is making sure that the metalworking industry will long remember its 70th birthday. For six months, "The Mill" has been planning the gala celebration, and judging from the enthusiastic response from the various groups of customers, technical societies, and the press, it has been time well spent. One of the most successful of the party's many surprises was a gay circus performance complete with band music, clowns, and firecrackers.

The event marked more than just the 70th anniversary of the company's existence, however. To the Cincinnati Milling Machine Co., the No. "70" is significant of the beginning of a new era, an era of peacetime progress. The officials at Cincinnati Milling are optimistic; and a tour through their plant in one of the miniature railroad cars provided for the purpose will convince the most skeptical that their optimism is more than just wishful thinking.

If a guest expected to find the company devoted exclusively to the manufacture of milling machines, as its name might indicate, he soon discovered the fallacy of his preconceived ideas. Al-

Technical Training Center of The Cincinnati Milling Machine Co .

Foundry, the world's largest in the machine tool industry, The Cincinnati Milling Machine Co.

though there is no scarcity of milling machines of every type in evidence, they account for only a portion of the plant's total output, which includes such products as broaching machines, grinders, Hydroform presses, transfer machines, and Flamatic hardening machines. Divisions of Cincinnati Milling produce grinding wheels, coolants, lathes and drill presses.

New products unveiled at the birthday celebration consisted of a line of heavy duty HyPowermatic milling machines, a Toolmaster milling machine, a No. 2 centerless grinder, a No. 0 centerless grinder, and a No. 1 cutter and tool grinder. Details of these new machines will be covered in the MACHINE and TOOL BLUE BOOK at a later date.

A trip through the company's technical training center, with its shops, class rooms, interview rooms, auditorium, and the Fred A. Geier Memorial Room, makes it clear that "The Mill" places great importance upon its employee training program. Twenty-one courses are offered in the new center. The total present enrollment is 275 students.

No expense has been spared in equipping the ultramodern research laboratories. Project workers have at their disposal such de luxe equipment as a radioactive tracer laboratory, an electron microscope, and an analog computer.

Visitors to the plant were both entertained and instructed as they viewed the company's new animated color cartoon film, "William Johnson and the Draggin," which warns of the "dragging" menace of obsolete equipment, and approaches the problem of replacement in a refreshing manner.

The amazing growth of the Cincinnati Milling Machine Co. during the past 70 years is perhaps brought out most forcefully by the life-size replica of the first plant, which has been constructed in the Administration building. The reproduction houses original Cincinnati machines actually built during the first years of the company's history. Even the paving stones in the street before the shop are the actual stones which paved the street in 1884.

Recently completed north wing of Engineering and Headquarters building houses Research, Plant Engineering, Advertising, Products Division Office and Cincinnati Lathe and Tool office and showroom.

Roll-Feeds in new plant

Roll-Feeds Corp., manufacturer of aircraft components and electrical equipment, has moved to its newly completed plant at Mendon and Angell Roads, Ashton, R.I.

The one-story plant has 30,000 feet of floor space on two acres of ground. The building is adjoined by a large parking lot.

Lincoln district managers study new welding developments

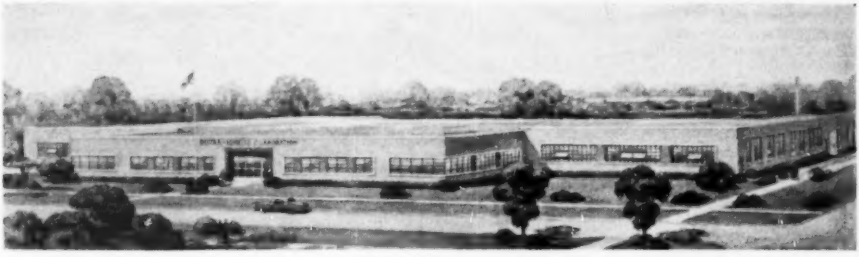
To arm its field men for what it calls its 1954 Cost Crusade, The Lincoln Electric Co., Cleveland 17, Ohio, recently called into its factory all of its district managers from all sections of the country. Meeting with members of Lincoln's development and application engineering staff, these 41 managers studied for three days how new developments in welding reducing possibilities. Lincoln's new powdered metal electrode, Jetweld, was demonstrated: with Jetweld, welding speeds are claimed to be twice as fast as with other types of manual electrodes, with quality comparable to automatic welds.

A new 6012 electrode designed for higher welding currents and speeds was also

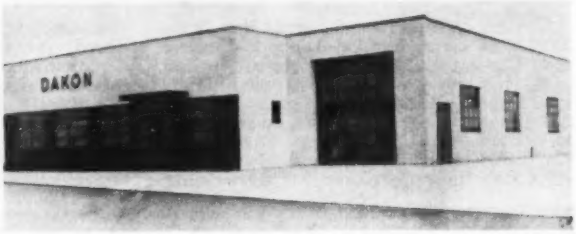
equipment could be successfully applied to reduce the cost of manufacturing and maintenance in the metalworking industry.

Several new developments in both machines and electrodes were studied by the district men with an eye to their cost studied along with new fluxes for automatic hardsurfacing. New techniques for the application of Twinarc welding were reported from the field, and field experiences in presenting new developments in welding clinics were also discussed and practiced.

The new building for the general offices and manufacturing plant of Boyar-Schultz Corp. has just been completed. Situated on a seven and one-half acre site at 2000 5th Ave., Broadview, Ill., the new building provides 71,000 square feet of space—an increase of 30% over the former quarters.



Dakon Tool and Machine Co., Inc., formerly located at 496 Broadway, Brooklyn, N.Y., has moved to larger quarters in its own building at 1836 Gilford Ave., New Hyde Park, Long Island, N.Y.



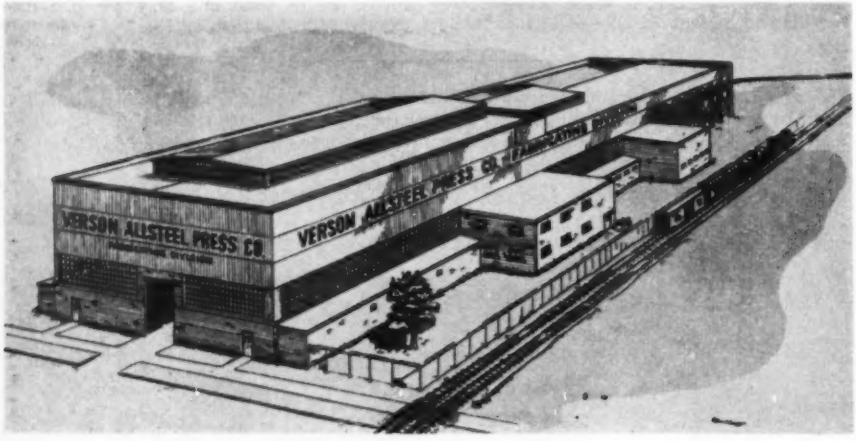
Omer E. Robbins Co. has moved into this new, modern one-story plant and office at 24800 Plymouth Rd., Detroit, Mich. Located on a 6 acre site, it provides 14,000 sq. ft. of manufacturing area and 2,500 sq. ft. of office space.

Verson Allsteel plans expansion

Verson Allsteel Press Co. has announced the breaking of ground for a $1,500,000 addition to the company's plant facilities at 93rd St. and Kenwood Ave., in Chicago. On completion it will bring Verson facilities to a point six times as great as they were eight years ago.

The new building will measure 90 x 450 feet and will house the fabricating division with facilities unequalled in the industry for producing weldments for the Verson line of stamping presses and other heavy machinery. Two 50-ton and two 15-ton cranes will be employed in the new building. A 2,000-ton press brake will be available for heavy bending and straightening.

Plans call for completion in November and full scale operation by the end of the year.



1955 Machine Tool Show . . . Chicago, Sept. 6 through 17

THE 1955 Machine Tool Show will be held in Chicago at the International Amphitheatre from September 6 to 17, inclusive, it was officially announced by the National Machine Tool Builders' Association.

Exhibitors (except for the trade press) will be confined entirely to American builders of machine tools, and exhibits will consist of machine tools only. No foreign builders will exhibit, and no foreign-built machine tools will be shown.

Over 150 companies will have the latest models on display. It will constitute the largest exhibit of machine tools ever held under one roof.

In conjunction with the Machine Tool Show, the Production Engineering Show will be held on the Navy Pier. This Show, devoted to the exhibit of mechanisms, instruments, and equipment that contribute to greater production, provides an opportunity for the display of accessories for which there will not be room at this year's Machine Tool Show. Both Shows will be under the management of Clapp and Poliak, who managed the previous Machine Tool Show in 1947.

In 1947 the Dodge Chicago plant, which housed the Show, provided ample space for both makers of machines and accessories. With 1955 Show space limited, the National Machine Tool Builders' Association requested Clapp and Poliak to stage the Production Engineering Show at the same time, thereby providing all concerned with ample exhibit facilities. Shuttle buses will run between the two shows.

To house the Machine Tool Show, a new extension with 188,000 sq. ft. of floor space is being added to the International Amphitheatre. With the Amphitheatre's 240,000 sq. ft., this gives the Machine Tool Show a total floor area of 428,000 sq. ft.

While substantially less than the combined area, for both machine tools and accessories, in the 1947 Show, it constitutes the largest available floor space in the country practicable for the exhibit of machine tools, with a display area about equal to that occupied by machine tools only in the 1947 Show. By contrast, the Cleveland Public Auditorium offers only 240,000 sq. ft., and the Atlantic City Public Hall only 230,000 sq. ft.

Thousands of new machine tool models will be shown, ranging in size from that of a small desk to that of a two-story house, and in weight from a few hundred pounds to well over 50 tons. The arena in the center of the Amphitheatre, with a ceiling clearance of 73 ft., provides space for the showing of the taller machines. Clearances in other portions of the exhibit floors range from 15 ft. to 26 ft. The floor load is unlimited in virtually all display areas except those on the second floor.

The display space will be comprised of the following areas:

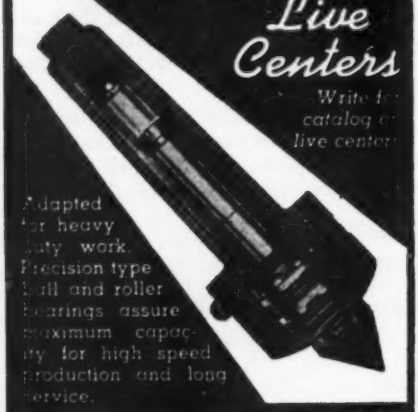
1. The Amphitheatre arena in the center of the building;
2. The north and south halls on either side of the arena;
3. The north and south halls on the second floor;
4. The new Exposition Hall, on the ground floor.

These areas will comprise in fact one enormous display room, which will have the appearance of a giant machine shop with nothing to obstruct

NIELSEN

Heavy Duty *Live Centers*

Write for catalog of live centers



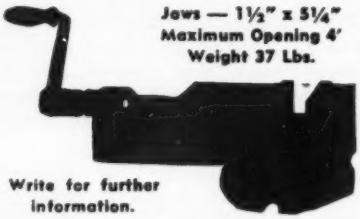
Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

NEW BRITAIN

SWIVEL VISE

Jaws — 1½" x 5¼"
Maximum Opening 4"
Weight 37 Lbs.

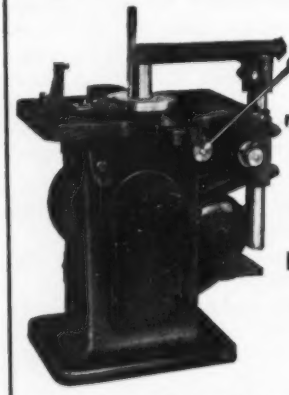


Write for further information.

The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

NEW BRITAIN TOOL & MFG. CO.
13 HARVARD STREET
NEW BRITAIN, CONN., U. S. A.

"DAVIS" KEYSEATERS



are moderately priced
Efficient
Economical
Durable

Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO.
407½ Exchange St. Rochester 8, N. Y.

Miccro *Supreme*

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7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY
8615 Grinnell Ave. • Detroit 13, Mich.

the view except the machines themselves. The Amphitheatre and the Exposition Hall are under a common roof, and open onto each other. Practically all of the machines will be in operation.

Ample power will be provided by a new high tension line from the Central Manufacturing District power plant. The total connected horsepower will be about 60,000 KVA, the largest load of any building in the world, and special transformers and lines will be installed to carry it.

The lighting system in the Amphitheatre has been augmented to bring it to the level of that in the new annex, which provides 30-foot candles at working levels.

A depressed railroad side track has been built, 451 ft. long, in the new Exposition Hall, which will accommo-

GILMAN *Standard* SLIDE ASSEMBLIES ....

ASSEMBLED TYPE

...SPEED BUILDING OF *Special* MACHINES

ASSEMBLED TYPE includes male and female members, gib and adjusting screws, return springs, stop screw, end shield and mounting holes. .

BASIC TYPE

BASIC TYPE includes male and female members, gib and adjusting screws.

Reduce designing and manufacturing time on your *special* production machines with these *standard* slide assemblies. Ample stocks assure good delivery.

- Available with sliding surfaces either *machined* or *hand scraped.*
- 52 types and sizes. *Widths* from 2" to 6"; *lengths* from 3" to 16"; *travel* from ¾" to 4".
- Manufactured to the highest standards of precision and quality.

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date ten railroad cars at one time. Machines can thus be unloaded from railroad cars directly onto the exposition floor. On the south end of the Exposition Hall there will be a truck platform which will accommodate five trucks simultaneously, also providing for unloading directly onto the exposition floor. It is estimated that at least 300 railroad cars and 1000 trucks will be required to bring the exhibitors' machine tools to the Show.

Visitors will enter by ramp or stairs to large registration booths on the second floor, where they will register and be given a badge. Admission will be by registration only. The Show hours will be 10:00 A.M. to 5:30 P.M. daily. The Show will not be open on Sunday.

In the registration area there will be a variety of services including checkroom, batteries of telephones with operators for long distance calls, a uniformed messenger service maintained by the American Machine Tool Distributors' Association, a booth for information about the Show or about Chicago, a Post Office, a telegraph office, a travel bureau with airline and railroad ticket offices, a housing bureau, a free interpretation service with translators where sales managers can meet overseas friends, and a lounge area with a buffet service.

There will be an internal communication system with overhead wires which transmit messages from the Show office to tiny pocket receiving sets carried by floor managers, who can then go to a telephone and call back.

There will be lunch stands scattered throughout all of the Show areas. Adjacent to the arena is a large sized cafeteria. In the auditorium there are two lunch rooms seating 300. In addition, the Show will enjoy the entire facilities of the Stockyards Inn, next to the auditorium, including the famous Sirloin Room, the Matador Room, and the Stockyards Inn cafeteria. There is also a cafeteria in the Exchange Building, two blocks west of the auditorium.

Visitors may reach the Show from the loop area by Show bus, by taxicab, by elevated, or by surface car. The time required will be about 20 minutes.

The Amphitheatre is situated between Halsted St. and Dexter Park Ave., and Exchange Place and 43rd Place. All buses and cabs will go to the Dexter Park side, and visitors by automobile should also go to that side since that is where the parking lot is located. Visitors coming by surface car or elevated will use the Halsted Street side.

Chartered Show buses will maintain a continuous shuttle service over three round trip routes as follows:

1. From loop hotels to the Machine Tool Show and back to the loop;
2. From loop hotels to the Production Engineering Show on the Navy Pier and back to the loop;
3. Between the Machine Tool Show and the Production Engineering Show.

Over 10,000 hotel rooms in Chicago have already been reserved for the Machine Tool Show. The Chicago Convention Bureau reports that on the basis of hotel reservations, this Show bids fair to be the largest industrial event in the nation's history.

Steamship and airlines are already making plans for overseas visitors to the Machine Tool Show. Special flights from various countries will be arranged, and space reservations will be made with various steamship lines. For the 1947 Show, 30 special flights were chartered by Pan American alone—and Show visitors occupied 300 cabins

on one cruise of the Queen Mary.

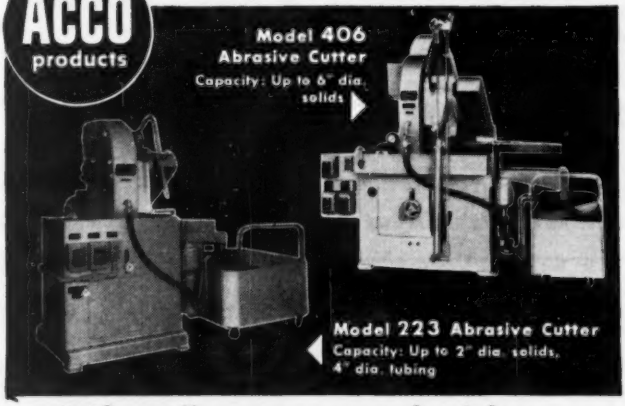
The offices of Clapp & Poliak, who are managing the Show, the offices of the National Machine Tool Builders' Association, and the Show press room will be located on a mezzanine above the northwest end of the arena. The hospital and first aid station will be on the main floor.

On the basis of previous experience, the Show will require over 200 electricians; over 200 machinery movers; and hundreds of guards, cafeteria attendants, messengers, floor managers, etc.

Visitors to the Show will consist chiefly of top executives of manufacturing companies, vice presidents in charge of operation, plant managers, engineers, designers, men engaged in

Campbell Abrasive Cutters

ACCO products



Quick cut-offs save you money—here's how . . .

1. Superior Sales Engineering Service. CAMPBELL engineers, experienced in every type of cutting problem, are available for consultation on YOUR cutting problems.

2. Economy and Speed of Operation. CAMPBELL Abrasive Cutters are built to do every type of cutting job with the utmost accuracy, efficiency and economy. Cuts are smooth and practically burr free.

3. Complete Line of Standard Machines. CAMPBELL Abrasive Cutters are available in the widest variety of styles and models. They are fully automatic and semi-automatic. Have many exclusive features.

Write today for Bulletin DH-301 on Campbell Abrasive Cutting Method

ACCO Campbell Machine Division
AMERICAN CHAIN & CABLE
937 Connecticut Avenue, Bridgeport 2, Connecticut

Wet and Dry Cutters and Nibblers

MICRO-HEIGHT GAUGE

BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Exclusive distributor for U.S. and Canada:

CLEVELAND INSTRUMENT CO.

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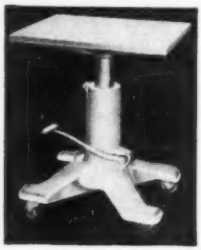
PORTABLE ELEVATING TABLE



Saves TIME and LABOR

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height from 31" to 46½", leaving operator's hands free. Table swivels and locks in any position.

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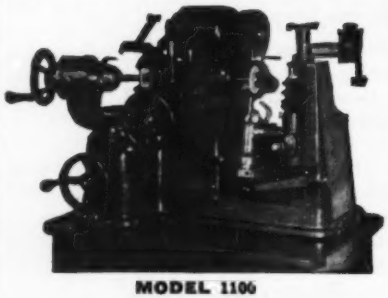
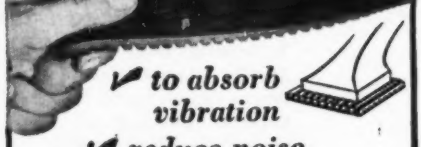


MODEL 1100

- **Capacities No. 0 Machine Screw to 1½" Hand Taps.**

HENRY P. BOGGIS & CO.
710 East 163rd Street
Cleveland 10, Ohio

Put machines on ISOMODE® PADS



- *to absorb vibration*
- *reduce noise*
- *cut maintenance*

Economical, effective mounting — 1 sq. ft. enough for 4 tons of machine weight. Neoprene — lasts for years. 5/16" thick, 18" square, ten to the standard package. Easily cut to shape and installed under most machines — big punch presses included. No cementing necessary. Write for Bulletin No. 415.

The MB Manufacturing Company, Inc.
1067 State Street, New Haven 11, Conn.

research and product development, production experts, and financial executives concerned with problems of cost reduction. It is estimated that at least 200,000 men in these classifications will attend the Show.

"Never before," says William E. Rutz, Executive Vice President and Works Manager, Giddings & Lewis Machine Tool Company, and Chairman of the Show Committee of the National Machine Tool Builders' Association, "have development and design in machine tools moved forward at such a rapid pace as has been the case during the last five years. And within the last year and a half this pace has been accelerated because the return of extremely competitive conditions throughout all American industry has made immediate cost reduction imperative.

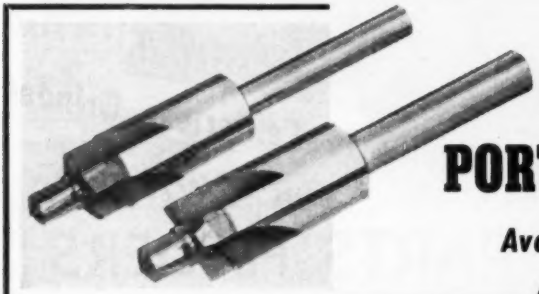
"The replacement of obsolete machines by new models that cut cost per piece produced represents the greatest single avenue of opportunity for savings open today to metal-working companies striving to maintain a competitive edge.

"The slogan of the Machine Tool Show is 'The world's best investment **in action.**' By visiting the Show the manufacturer may see **in operation,** and compare, the various makes and types of machines that may be appropriate for his replacement requirements. He has not had such an opportunity for seven years; and will not have another for five more."

Barber-Colman buys Hendey Machine

Barber-Colman Co., Rockford, Ill., has announced the purchase of the Hendey Machine Co., Torrington, Conn., except for its manufacturing facilities. It will be known as the Hendey Machine Division of Barber-Colman Co.

The new division will manufacture the complete line of Hendey tool room and manufacturing lathes and shapers. Manufacturing operations will begin at the Barber-Colman plant within the next two or three months.



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PORTING TOOLS

Available from Stock

AND-10050

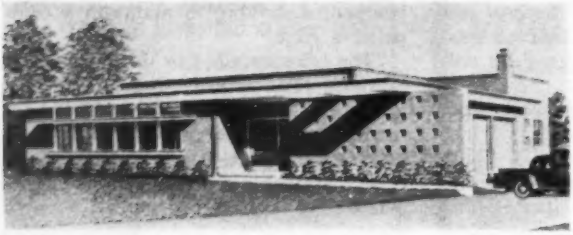
Send for valuable data sheet

A complete line of carbide tipped combination ream, counterbore and facing tools to form AND-10050 standards. Tube sizes 2 through 24 in turret lathe and drill press types. Special tools made to order.

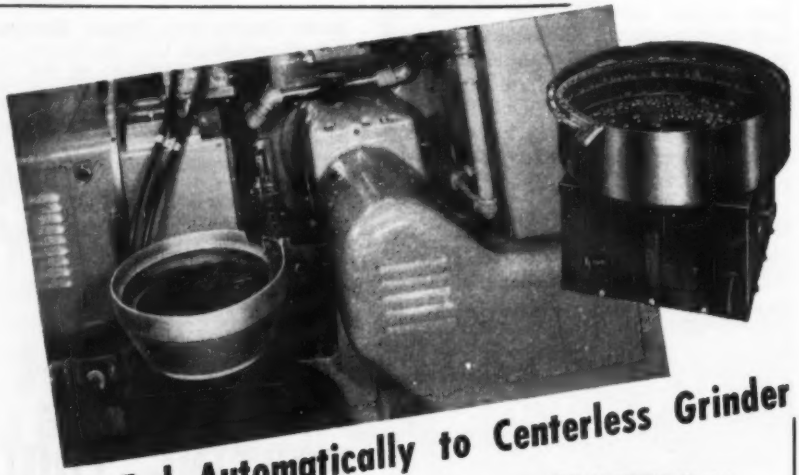
WETMORE TOOL & ENGINEERING CO.

Engineers **Designers** **Manufacturers**

5320 E. Washington Blvd., Los Angeles 22, Calif. **AN 9-7266**



The new Farmington Engineering Co. plant is conveniently located at 72 Granby St. in Bloomfield, Conn., near Hartford.



Slugs Fed Automatically to Centerless Grinder

with *SYNTRON*

PARTS FEEDERS

Small parts emerge from feeder trough in desired position, one at a time, at variable controlled speeds.

Providing completely automatic, oriented, single file feeding to grinding, packaging, inspecting, and many other automatic machines—Syntron Parts Feeders greatly increase capacities and speeds for production handling of small parts. Economical—compact—easy to install.

Write For Complete Catalogue Data—Free

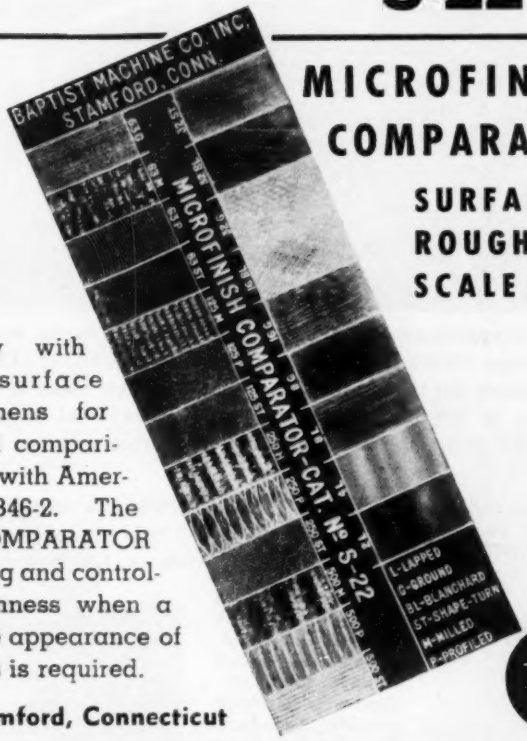
SYNTRON CO.
300 Lexington Ave. Homer City, Pa.

The recently completed offices and plant of the Burg Tool Mfg. Co., Los Angeles, represent the fourth expansion in the 12 year history of this company. The modern 22,000 sq. ft. structure is laid out for highly efficient production line operation.

THE *New* **S-22**

MICROFINISH COMPARATOR

SURFACE ROUGHNESS SCALE



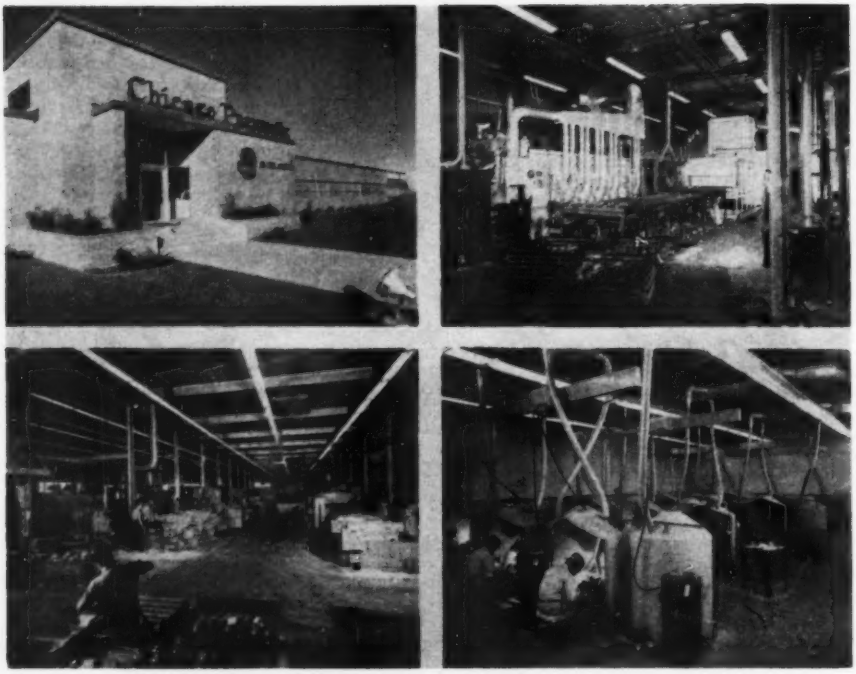
MADE BY

Electro-forming

Provides industry with established flat surface roughness specimens for visual and tactual comparison in accordance with American Standard B46-2. The MICROFINISH COMPARATOR is used in specifying and controlling surface roughness when a product having the appearance of machined surfaces is required.

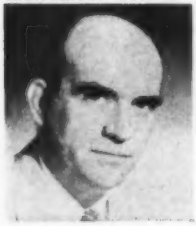
$15.00 F.O.B. Stamford, Connecticut

BAPTIST MACHINE CO.
STAMFORD, CONN.



Recently completed Fort Worth, Texas, plant of the Chicago Pneumatic Tool Company. Plant contains 130,000 sq. ft., and was completed at a cost of $4,500,000. Pictured below: 1. Front facade has brick walls, other walls are block, asbestos siding. 2. Heat treating equipment. 3. General manufacturing areas have wood block floor for long life in spite of hard wear. 4. Air conditioned welding shop.

Brush Electronics buys Digital Instrument Co.



W. R. Burwell

W. R. Burwell, president of Brush Electronics Co., Div. of Clevite Corp., Cleveland, has announced that Brush has purchased the assets of the Digital Inst. Co., Coral Gables, Fla., manufacturer of electronic counters. **Meryl C. Burns**, former president of the Florida concern, will serve as manager of the Digital Instrument Dept. of Brush Electronics.

Three new divisions for Brown and Sharpe

The Brown & Sharpe Mfg. Co., Providence, R.I., has announced the formation

F. F. Manchester

A. Dean Hunter

Frank A. Benoit, Jr.

of three additional divisions in its manufacturing organization at the Promenade St. plant. **A. Dean Hunter,** formerly works superintendent, was named division superintendent of the screw machine division; **Frank E. Manchester** was made division superintendent of a central services division; **Frank A. Benoit, Jr.,** was named division superintendent of the foundry division.

Lees-Bradner forms new division

The Lees-Bradner Co., Cleveland, has announced the formation of a new divi-

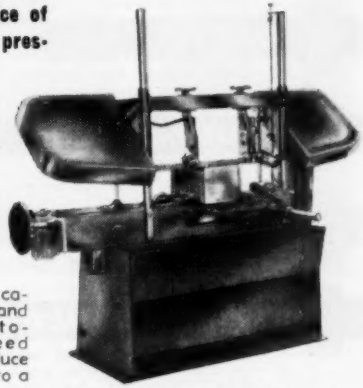
Fletcher Gleason

VARIABLE SPEED DRIVE...

now STANDARD EQUIPMENT on ALL W. F. Wells & Sons Saws

Provides speeds from 50 to 290 f.p.m. Combined with a graduated metering valve on our fully hydraulic models, this feature permits choice of proper blade speed and pressure for maximum production and blade life from high speed or high carbon steel blades.

2 new models with full hydraulic operation—MODELS W and F →



MODELS W and F—9"x18" and 14"x18" capacity, respectively, feature full hydraulic operation. All welded steel base—more rigid for heavier cutting. Welded, one-piece cutting head for swifter blade changes and easier chip removal. Larger capacity coolant and chip tray. Automatic bar feed available to reduce operator's time to a minimum.

AUTOMATIC BAR FEEDS ARE AVAILABLE FOR BOTH MODELS

MODEL H — the economy, hinge-type model in our line. 9" x 16" capacity. One-piece welded frame lowers hydraulically. Pressure easily adjusted for proper cutting. Special precision guides give longer blade life.

We also make . . .

- **Automatic bar feeds for duplicate cutting. Stock stands for positive alignment of stock. Coolant systems for wet cutting, and other accessories.**
- **Custom-built machines for special applications.**

W. F. WELLS & SONS

THREE RIVERS, MICH.

sion of the company to market and service its line of Cri-Dan high-speed threading machines. The new unit will be headed by **Fletcher Gleason**, formerly chief processing engineer of the company.

Swedish machines on display

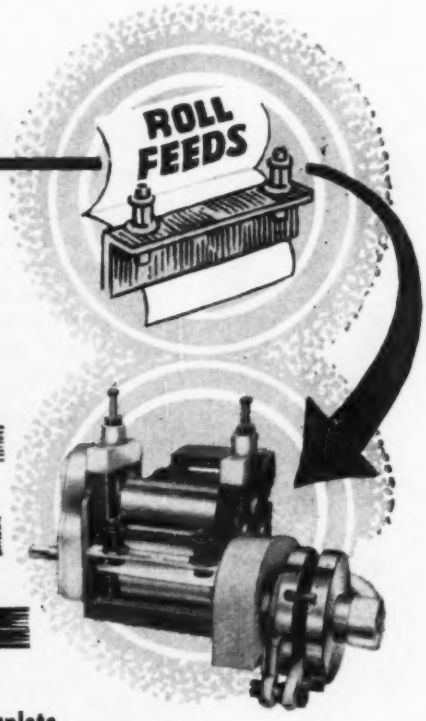
The complete line of drilling, milling and grinding machines made by Arboga in Sweden is on display under power at 118-122 Church St., Newtown, Ohio.

Bliss and C.I.T. renew installment selling program

E. W. Bliss Co., Canton, Ohio, has announced that its five-year association with C.I.T. Corp., industrial financing firm, has been extended. **James C. Keney** has been appointed to the sales staff of the Bliss Chicago district office.

John M. Horvath has been appointed as a direct factory representative for the Hy-Pro Tool Co., New Bedford, Mass.

"RFC" ROLL-FEEDS



FITS ANY PRESS
For side or rear feeding. All attachments for installing furnished, including disc and connecting linkage.

CAN'T SLIP
Each wedge has four points of contact to safeguard accuracy.

REVERSES INSTANTLY
Merely shift feed finger spring from one lug to the other.

FEEDS IN THOUSANDTHS
Amazingly accurate stock movement assured.

MAINTAINS ORIGINAL SETTING
Regardless of use or wear. No ratchets or pawls to wear down and "Throw off" feed spacing.

Ready for mounting! Furnished complete.

Write today for latest Bulletin.

EARLY DELIVERY ON STANDARD MODELS

Roll-Feeds Corporation

ASHTON, R. I.

I. Wendell Hamm has been appointed director of manufacturing for the Carborundum Co., Niagara Falls, N.Y. **Burchard M. Day** has been appointed to the position of advertising manager.

Mrs. F. W. Derbyshire has recently been elected president of the F. W. Derbyshire Corporation of Waltham, Mass. She will also continue as treasurer. Her son, **Richard F. Derbyshire**, has left the employ of the company and gone into business for himself.

The Cushman Chuck Co., Hartford, Conn., has announced the appointment of **W. H. Jones** as its representative in southern New Jersey, Delaware, and Virginia. **Frederick H. Fippinger** is the New England sales representative, recently appointed

The Carpenter Steel Co., Reading, Pa., has appointed **Douglas R. Beggs**, formerly director of personnel, assistant to the vice-president — production. **Harold W. Miller**, formerly assistant general super-

Swanson TURRET INDEXING UNITS

Provide a basic chassis to save time and cost in designing and building special automatic machines for a wide variety of manufacturing operations.

VERSATILE
ACCURATE
RUGGED

These complete* ready-made units are available on short delivery to help solve your automation problems NOW.

*furnished with motor, drive, wiring and push-button controls.

STANDARD UNITS:
20" — 30" — 40" Turret dia.
8 — 16 — 24 — 32 work stations.
1 to 4700 indexes per hour.

• Write for bulletin TMB •

ENGINEERS and BUILDERS of SPECIAL AUTOMATIC MACHINES

SWANSON
TOOL & MACHINE PRODUCTS INC. ERIE, PA.

intendent, has been advanced to chief plant engineer. **O. T. Thompson** has been appointed assistant branch manager of the Detroit territory. **R. A. Kokat** was named assistant branch manager of the Philadelphia operations.

The E. Horton & Son Co., Windsor Locks, Conn., has announced the appointment of **George S. Chiaramonte** to the newly created position of general sales manager of the company.

Henry W. Koester, service representative for Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has been transferred from the home office to Los Angeles, which will be his headquarters for the servicing of G & L equipment on the West Coast.

Danly Machine Specialties, Inc., Chicago, has appointed **Howard E. Lynch** as sales engineer in charge of its new office in Buffalo, N.Y.

SIGOURNEY

M-100

the **PRECISION BENCH DRILLING MACHINE**

No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

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HARTFORD 6, CONN.

Sole Sales Agent

PRATT & WHITNEY

Division Niles-Bement-Pond Co. · · · West Hartford, Connecticut

ISG54

Lawrence Remiker

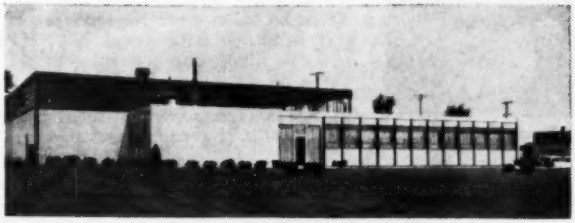
Lindberg Engineering Co., Chicago, has announced the appointment of **L. H. Remiker** to head up its newly formed field-erected equipment division. Other appointments to this division are: **R. A. (Buck) Hastings,** sales dept. manager; **C. P. Masure,** purchasing agent; **E. B. Jones,** chief engineer.

Earl A. Oldham will represent the Lufkin Rule Co., Saginaw, Mich., in San Francisco, northern California, and Nevada, according to E. H. Meibeyer, Lufkin vice-president.

R. A. Hastings

New automation machinery plant

The opening of a new plant at Birmingham, Mich., to house automatic research and experimental activities was announced by Richard Sahlin, president of Sahlin Engineering Co.



Typical of the automation machinery to be built in the plant are the Sahlin transfer machines for sheet metal lines. The company was formed seven years ago to manufacture Iron Hand unloading machines. It will continue its manufacturing operations at Detroit, Flint and Hazel Park. Engineering and general offices will also be located in the new plant.

Package Machinery to buy Reed-Prentice

In a joint statement by Roe S. Clark, president of Package Machinery Co., East Longmeadow, Massachusetts, and Frederick W. McIntyre, Jr., president of Reed-Prentice Corp., Worcester, Mass., their respective stockholders were informed that negotiations have been completed whereby Package Machinery Co., subject to the fulfillment of certain conditions, is offering to purchase the common stock of Reed-Prentice Corp. from its stockholders at a price of $12 per share.

During the past five years, four other companies have been purchased by Package Machinery: Frank D. Palmer Co.; Rite-Way Products Co.; the National Bread Wrapping Machine Co.; and the Transparent-Wrap Machine Corp.

Industrial Crane expands

Industrial Crane & Hoist Corp. on November 1 moved to new enlarged office and plant facilities at 1536 South Paulina St., Chicago 8, Illinois. With 160,000 square feet of space now available and with installation of new machinery and equipment the company has more than doubled manufacturing capacity.

A. F. Davis receives welding award

A. F. Davis, vice-president and secretary of the Lincoln Electric Co., Cleveland, Ohio, has been presented the Samuel Wylie Miller Memorial Medal for most outstanding contributions to the advancement of welding. The award was made during the national fall meeting held in Chicago, November 1-5. Davis has been active in welding for 40 years.

A. F. Davis

Architect's drawing of recently completed plant of the Michigan Drill Head Co., Detroit. The new building is expected to more than double the company's production.

Hugh T. Price, Jr.

Hugh T. Price, Jr., was recently made factory manager of Norton Company's grinding machine division, Worcester, Mass., replacing **Iver G. Freeman** who becomes vice-president of Reed-Prentice Corp. **Roland T. Nelson** replaces Price as production manager, while **Oscar A. Erickson** takes over Nelson's job as planning engineer. **Raymond M. Rebert** has become chief chemist in charge of the chemical section of Norton's research and development department. He replaces **Mark O. Lamar,** who retired after 37 years with the company.

Roland T. Nelson

Paul H. Taylor's election as a director and vice-president in charge of the research and Hydra Spring divisions of the Wales-Strippit Corp., North Tonawanda, N.Y., has been announced by President Richard W. Boebel.

Three promotions have been announced in the carbide div. of Firth Sterling Inc. **M. L. Backstrom** has been promoted to assistant sales manager and is succeeded in his former post of chief engineer by **W. E. Montgomery. John Gabrenas** has been named assistant chief engineer. Also announced is the appointment of **W. R. Sutton, J. F. Kroeger** and **J. J. Journeycake** as carbide service engineers in the Detroit, Los Angeles and Houston districts respectively.

At the Jones & Lamson Machine Company's annual stockholders' meeting at Springfield, Vt., a new and larger board of directors was elected: **E. S. French,** chairman; **K. Hazen Woolson,** vice-chairman; **Hardage L. Andrews; Charles E. Cotting; Carl F. Woods; R. W. Stoddard; John E. Lovely; Holmes H. Whitmore;** and **J. Hartness Beardsley. Norman T. Harrison** has been elected controller of J&L.

Three appointments of Super Tool Co., Detroit, have been announced by Gordon J. Birgbauer, president. **Milton J. Steffes,** formerly sales manager, has been promoted to chief engineer. **Kenneth R. Fisher** succeeds Steffes as sales manager. **Louis B. Szal** has been promoted to works manager.

Oscar A. Erickson

Raymond M. Rebert

Mark O. Lamar

Paul H. Taylor

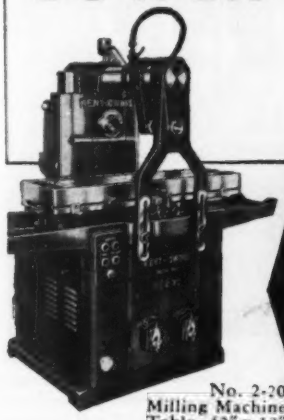
Elmer B. Jones

Gardner Machine Company, Beloit, Wis., has announced the following personnel changes: **R. E. Price** has been named general manager; **Russell L. Dustman, Jr.**, has been appointed manager of the machinery sales office in Richmond, Ind.; **John E. Schobinger** has been named manager of the Detroit sales office for the machinery division.

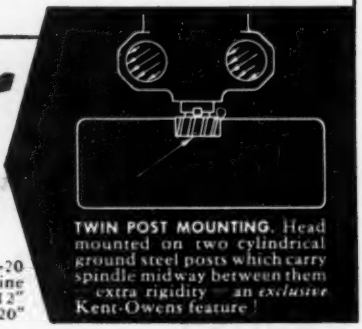
R. J. Herbert will now handle the Chicago - Detroit - Cleveland areas, and **William Burke,** the New York - Philadelphia - Boston - Pittsburgh - Buffalo - Niagara areas for the Ace Drill Bushing Co., Inc., Los Angeles.

R. L. Dustman, Jr.

LOWER MILLING COSTS!



No. 2-20 Milling Machine Table, 42" x 12" Table travel, 20"



TWIN POST MOUNTING. Head mounted on two cylindrical ground steel posts which carry spindle midway between them — extra rigidity — an *exclusive* Kent-Owens feature!

Kent-Owens builds 'em *rugged . . . simple . . .* and *versatile . . .* machines adaptable to countless milling jobs. Designed for rapid, easy set-up and cost-saving operation. Extra rigid head mounting assures balanced load. Greater cutting efficiency with smooth, powerful cutter drive—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machines Co., Toledo, Ohio.

KENT-OWENS

Milling Machines

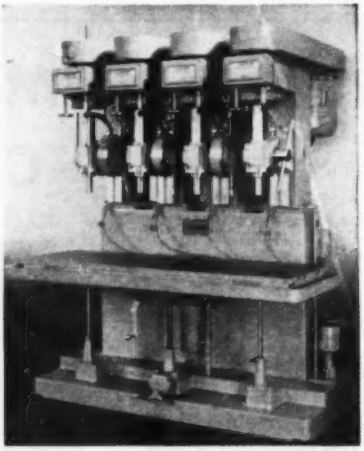
R. E. Price

Townsend Co., New Brighton, Pa., recently announced the retirement of its secretary-treasurer, **F. C. McKee,** and the election of two new vice-presidents. **H. E. Chilcoat** will be vice-president-general sales manager and **H. C. Weidner, Jr.,** vice-president-technical sales. **D. C. Fabiani** was named to succeed McKee as secretary-treasurer.

Frank Pfefferle has become special projects manager, **Alfred Baumgartner,** sales manager, and **Joseph Warren,** advertising manager for the Cincinnati Shaper Co., Cincinnati, Ohio.

C. P. Masure

PRICED
for economy
BUILT
for long life



Illustrated is a Leland-Gifford No. 3-MVB Four Spindle Drilling Machine equipped with a Ruthman Pump.

Ruthman
GUSHER
coolant pumps

Based on performance Gusher Coolant Pumps are economical in initial price . . . economical in operation. They give split second coolant flow—use less power when throttled—require a minimum of maintenance. Pre-lubricated heavy-duty ball-bearings and an electronically balanced rotating shaft assembly guarantees long trouble-free life for your Gusher Pump. *Write for catalog today.*

THE RUTHMAN MACHINERY CO.
1816 READING ROAD CINCINNATI, OHIO

John E. Schobinger

Elroy L. Siversten has been appointed salesman in the Los Angeles office of Cincinnati Milling Products Div., Cincinnati Milling and Grinding Machines, Inc.

Reid Brothers Co., Inc., Beverly, Mass., has announced the appointment of Fuchs Machinery and Supply Co., Omaha, Nebraska, and Gross Machinery Co., Ltd., Toronto, Ontario, as authorized distributors.

Appointment of **Berton E. Rogers** as general factory manager for Vickers Inc., Detroit, has been announced by W. K. Allen, vice-president-production.

Berton E. Rogers

RED-E

BULL NOSE and PIPE TYPE

Anti-Friction

CENTERS for every application

YOUR DISTRIBUTOR IS STOCKED, READY TO SERVE YOU!

ACCURACY GUARANTEED

Heat treated alloy steel bearing head. Available in all standard or special tapers and straight shanks. Head sizes up to 6" dia. carried in stock. Other sizes made to your specifications.

Buy from your RED-E Distributor

CENTER *Specialists Since* 1908

RED-E TOOLS READY TOOL COMPANY

550-B Railroad Ave. • Bridgeport 5, Conn.

B. L. Owens

The following appointments have been announced by Stanley J. Roush, president of Atkins Saw Division, Borg-Warner Corp., Indianapolis, Ind.: **B. L. Owens** has been advanced to sales manager of the division. **M. A. Bauer** is assistant sales manager. **M. A. Straub** is assistant sales manager in charge of advertising and sales promotion. The appointment of **R. A. Carlson** as vice-president and manager of engineering for the Rockford Clutch Division of Borg-Warner Corp. at Rockford, Ill., was announced recently by H. L. Emerson, president of that division.

M. A. Bauer

Don V. Slaker

The Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., has announced the appointment of **Don V. Slaker** as chief engineer, dump car department.

Barber-Colman Co., Rockford, Ill., has announced the appointment of **Howard A. Nelson** as administrative assistant to the sales manager in the machine and small tool divisions. **Nels O. Thornbloom** has been appointed chief engineer of machine tool sales and **Stuart J. Johnson** becomes chief engineer of the small tool division.

M. A. Straub

Engineered Live Centers . . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

STURDIMATIC TOOL COMPANY

3902 F STREET • DETROIT 16, MICH

Thomas B. Doe, Jr.

Appointment of **Thomas B. Doe, Jr.**, as master mechanic for Vickers Inc., Detroit. has been announced by W. K. Allen, vice-president—manufacturing.

Neal L. Cobb, chief of tool design, has been appointed chief engineer of the Fellows Gear Shaper Co., Springfield, Vt. **Arthur Tobin** has succeeded **Stewart Barton** as central district manager. Barton will devote full time to his duties as assistant sales manager.

Neal L. Cobb

Philip O. Geier, Jr.

Philip O. Geier, Jr., has been appointed sales manager of the Cincinnati Milling Products Div., Cincinnati Milling & Grinding Machines, Inc.

National Tool Co., Cleveland, Ohio, has added two vice-presidents to the management staff. **Raymond D. Lindstrom** was elected vice-president — manufacturing; **Joseph B. Clough** was elected vice-president — sales.

Joseph B. Clough

The machine tool division of Kalamazoo Tank & Silo Co., Kalamazoo, Mich., has announced the appointment of **Don Hucke** as representative for the state of California.

Raymond D. Lindstrom

Robert H. Morse, Jr., president, Fairbanks, Morse & Co., Chicago, has announced the appointment of **R. H. Morse III** to assistant to the vice-president in charge of sales. **W. E. Watson** has been appointed manager of the Beloit, Wis., works of the corporation.

Donald M. Laflin, vice-president in charge of sales, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., was elected a vice-president of Amertool Services, Inc., at the annual Amertool meeting in Mexico City.

Robert J. Sutton

Carl G. Meister

Appointment of **Carl J. Meister** as vice-president—sales of the Atkins Saw Div. of Borg-Warner Corp. has been announced. **Robert J. Sutton** has been appointed treasurer and secretary.

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., has announced the appointment of **Jacob J. Jaeger** to the newly created post of chief engineer, machinery engineering department.

Jacob J. Jaeger

Eugene Parks

Appointment of **Eugene Parks** as president has been announced by the Fonda Gage Sales Corp., Stamford, Conn.

The Morris Machine Tool Co., Cincinnati, Ohio, has announced the appointment of **Carl W. Larrick** as works manager.

Appointment of **Charles H. Crawford** as plant manager of Colonial Broach Co., Detroit, was recently announced by Arvid O. Lundell, president.

Carl W. Larrick

T. J. Rancont

P. R. Marsilius, president of the Producto Corp., Bridgeport, Conn., has announced the appointment of **T. J. Rancont** as district sales manager of the Producto Detroit branch.

C. H. Crawford

Arthur J. Miller, Jr.

Chicago Wheel & Mfg. Co., Chicago, recently announced the election of **Arthur J. Miller, Jr.**, as president and general manager of the company. He succeeds **A. J. Miller, Sr.**, who was named chairman of the board. Other officers elected were: **Henry E. Miller**, vice-president and general production manager, **Henry M. Mann**, treasurer and chief of sales engineering, and **Arthur T. Dalton**, secretary and general sales manager. **I. Danielson** was elected vice-president emeritus, and will continue on in his capacity of advisor on financial matters.

Robert G. Field

The announcement of the promotions of two executives of Lincoln Park Industries, Inc., Lincoln Park, Mich., has been made by Gene DeMambro, president: **John (Jack) Delaney** has been appointed vice-president and factory manager; **Robert G. Field** becomes sales manager and administrative assistant.

Archie F. Wilson

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **Archie F. Wilson** as director of manufacturing.

John Delaney

Richard M. Morgan, who recently joined Miller Fluid Power Co., Melrose Pk., Ill., has been placed in charge of production tooling, production engineering and plant layout. **Dave Alexander** was appointed as Miller's new salesman for the Philadelphia, Pa., area and will work with **Paul Davison** who has been representing Miller in this territory for the past year. **Wilfred A. Pehl** has been appointed field

Paul W. Polk

engineer for the Cleveland, Ohio, territory. **John Howard Shankland** has joined the Miller organization as market research analyst. **Terry Morris** has been advanced to the order processing department. Succeeding Morris as production control supervisor is **George Permanian.**

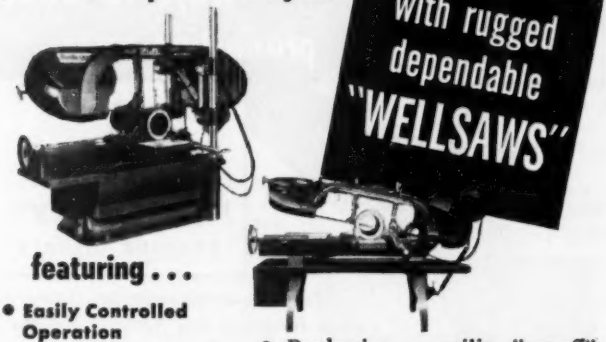
William J. Fabish has been appointed eastern representative for Hammond Machinery Builders, Inc., Kalamazoo, Mich.

Paul W. Polk was elected president of the Threadwell Tap & Die Co., Greenfield, Mass., at the recent meeting of the

William J. Fabish

METAL "CUT-OFF"

becomes a preferred job...



featuring . . .

- **Easily Controlled Operation**
- **Fast, Accurate Action**
- **High Job Productivity**
- **Low Operating Cost**
- **Long, Dependable Service**

• Production, or utility "cut-off" work in your shop becomes a *Preferred Job* with a Wells Horizontal Metal Cutting Band Saw, because the *operation* is so *easy to control.* Even in the hands of the "new guy," a Wells Band Saw can be counted on to *Reduce* your *Production Costs,* through greater efficiency, more accurate cutting and real dependable service.

Call your Wells Distributor, or write for *Job-Engineering Service.*

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORP.
707 COOLIDGE AVE. • THREE RIVERS, MICH.

Joseph E. Smith

company directors. Other officers are **Louis F. Polk,** chairman and treasurer; **John P. Bernard,** vice-president; **R. F. Whisler,** vice-president and assistant treasurer; **Edward T. Noe, Jr.,** secretary; **Esther Hertter,** clerk; and **Glenn E. Price,** assistant secretary.

Bryant Chucking Grinder Co., Springfield, Vt., has announced the appointment of **Joseph E. Smith, Jr.** as manager of the gage and spindle division of the company.

T. G. Barnes, vice-president sales, has announced the promotion of **J. S. Roller**

J. S. Roller

1 NEWCOMER **ECONO-CLAMP** TOOLS

2 revolutionary ways to beat production costs

2 NEWCOMER **"THROWAY"** CARBIDE INSERTS

Available in all styles for Heavy Duty Roughing and Accurate Finishing

ELIMINATE GRINDING . . . SPEED PRODUCTION

Here's why modern mass production facilities are saving up to 50% on carbide tooling costs with Newcomer Econo-Clamp Tools and "Throway" Carbide Inserts.

- **Ruggedly designed alloy steel holder gives maximum strength.**
- **Top clamp locates cutting edge accurately after each indexing.**
- **Hardened steel anvil furnishes a solid, flat seating surface for half length or "Throway" inserts.**
- **"Throway" inserts give multiple cutting edges without grinding.**
- **One holder uses a full length, half length or "Throway" insert.**

SEND TODAY FOR BULLETIN.

NEWCOMER PRODUCTS, INC.
LATROBE, PENNSYLVANIA
General Sales Office: 512 Franklin Ave., Pittsburgh 21, Pa.

Emil Gairing

from assistant general sales manager to general sales manager of Firth Sterling Inc., Pittsburgh.

Robert Brumder, president of Waukesha Tool Co., Waukesha, Wis., has announced that **Emil Gairing,** founder and former president of the Gairing Tool Co., Detroit, has joined Waukesha as a stockholder, director and executive vice-president.

H. J. Crain

Appointment of **H. J. "Jack" Crain** as sales engineer for Modern Industrial Engineering Co., Detroit, has been announced by W. H. Bibbens, president. Crain was formerly master mechanic and chief tool designer for Packard Motor Car Co.

Jones & Lamson Machine Tool Co., Springfield, Vermont, has appointed Rickert Industrial Supply Co., Milwaukee, Wis., as a stocking distributor of automatic opening die heads, chasers and fixtures. This new distributorship will cover eastern Wisconsin and northern Michigan.

Tools Incorporated, Philadelphia, has been named as sales representative by Lodding Inc., of Worcester, Mass. **Edmund Hollingsworth** is president of the Philadelphia firm. In the Baltimore area, **Robert S. Williams, Jr.,** has been designated as Lodding representative. For Poughkeepsie and environs in New York state, J. L. Petz Co., Pleasant Valley, N.Y., is sales representative.

Adamas Carbide Corp., Kenilworth, N.J., has announced the appointment of **William C. Harper** as its sales representative for southern Ohio and eastern Kentucky.

Firth Sterling Inc., Pittsburgh, has appointed four new distributors. K. P. Wesseling Co. will service the St. Louis area; the Cincinnati Supply Co. Inc. will be an additional distributor in the Cincinnati area; the Noland Co., through its branches in Norfolk, Newport News, Roanoke, Washington D. C., Atlanta, Chattanooga and Birmingham, will provide coverage in those areas; the Phoenix Steel Supply Co. will distribute throughout the Midwest, primarily in the Chicago area.

Appointment of Bryant Machinery and Engineering Co. as Midwest sales representative has been announced by Henry & Wright, Division Emhart Mfg. Co., Hartford, Conn. Operating from its Chicago and Milwaukee offices, Bryant's territory will comprise Iowa, most of Wisconsin, northern Illinois and northern Indiana. **B. B. Patton,** H&W factory representative in Chicago, will continue to cover the territory, using Bryant's Chicago office as headquarters.

Adamas Carbide Corp., Kenilworth, N.J., has announced the appointment of Production Tooling Service, Birmingham, Ala., as its sales representative for the states of Alabama and Tennessee.

D & M AUTOMATIC PUNCH PRESS GUARD

No Springs
•
No Cables
•
$28.00 TO $36.00 F.O.B. BUFFALO, N.Y.
•
Low Maintenance

• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance. *Write for complete information.*

Immediate Delivery

D&M GUARD Co.

895 Military Rd., Buffalo 17, N. Y.

Gisholt announces new type payment plan

A new extended payment plan with some interesting new twists has just been announced by the Gisholt Machine Co. This plan, coupled with leasing plans announced in April, 1954, is claimed to provide a complete program which makes it easier for many firms to have the most modern Gisholt tools at all times.

Expressing confidence that a large percentage of machine tool sales would come under the time payment plan in the future, George H. Johnson, president, pointed to the new tax codes and the faster depreciation allowable on new equipment.

Liberal terms

Any new Gisholt machine can be obtained with an initial down payment of 20%. The balance may be spread in equal payments over 12, 24, 36, or 48 months, depending upon the plan selected.

The Gisholt method reverses the usual pattern of handling interest charges by starting with the lowest amount and gradually increasing. This method gives the buyer the use of that much more cash during the earlier payments. Also, since the buyer has the privilege of prepaying notes at any time without penalty, he may thus avoid the higher interest payments toward the end.

Interest rates range from 3.25% on the original unpaid balance for the one-year plan to 3.06% for the four-year plan. Gisholt absorbs legal fees up to the time the machine is shipped.

New bulletin offered

With the rapid developments in leasing and buying industrial equipment, many executives are puzzled as to which methods to use under certain conditions. To help them answer their questions, Gisholt has prepared a new bulletin on the subject. It discusses leasing and time payment plans, makes cost comparisons, outlines depreciation under the new tax code, etc.

The bulletin is entitled, "What You Should Know About Buying and Renting Machine Tools." Copies may be obtained by writing Gisholt Machine Co., Dept. BB, Madison 10, Wis.

Tapmatic expands

With the completion of their new building in Costa Mesa, California, (Los Angeles area), Tapmatic Corp. has announced a major expansion with full production facilities for the manufacture of their line of Tapmatic and Tapmaster tapping attachments.

Occupying a ground area of 94,000 square feet, the first unit of the plant has been completed. It is 6,000 sq. ft. pre-cast concrete tilt-up structure which is being equipped with full machining facilities.

Wilton Tool builds $500,000 plant

The Wilton Tool Mfg. Co. Inc. are in the process of building a new general office and factory building at 9525 Irving Park Rd., Schiller Park, Ill. According to Wilton's president, Hugh W. Vogl, the expansion program will cost approximately half a million dollars; roughly 65,000 square feet of floor space will be included in the single-story main building which is located on an attractive five acre tract, with ample parking facilities. Offices are in the front of the building, and the factory space is adjacent to a railroad siding. A January moving date is anticipated.

New offices, new machine

United Machinery Sales Co., Chicago, has established new offices at 7709 S. Ashland Ave.

The company has enlarged facilities for sales and has completed production on a new machine for the metals fabricating industry, which places special emphasis on heating, piping and air conditioning apparatus and its fabricating and installation.

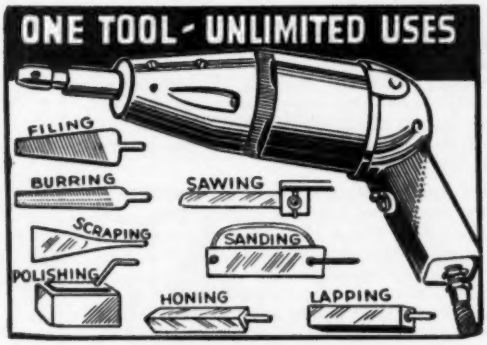
B-R-E-A-K . . .
Hand Finishing Bottlenecks

with

PORTABLE • ELECTRIC RECIPROCATING TOOLS

These handy tools will cut out many tedious hand filing and finishing operations — Increase Production — Produce Uniform Work.

Light in weight—Delivers 1/8" or 3/8" fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.



ACME TOOL COMPANY

72 WEST BROADWAY NEW YORK 7, N. Y.

The John Bertram & Sons Co. Ltd. has been named to manufacture Mor-Speed special production equipment in Canada. Design and engineering work will continue to be done by the Morris Machine Tool Co., Cincinnati, Ohio.

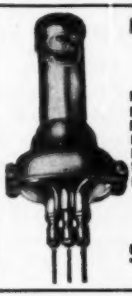
The Fulflo Specialties Co., Blanchester, Ohio, has announced the appointment of Hayden and Co., Chicago, as its representative in the Chicago area.

Carl B. Christensen, vice-president and general manager of the Ready Tool Co., Bridgeport, Conn., has appointed Littlejohn Co., Los Angeles, as their representative for southern California, Arizona and southern Nevada.

The Basco Mfg. Co., of Stamford, Conn., has announced the appointment of E. V. Nielsen, Inc., as its international sales agents. The Nielsen firm, headed by E. V. Nielsen as president and general sales manager, will be responsible for all sales of the Basco magnet separators. They will appoint distributors and sales representatives. Nielsen's offices are at 129 Broad St., Stamford, Conn.

Adamas Carbide Corp., of Kenilworth, N.J., manufacturers of standard carbide tools, tool tips, dies and wear parts, have announced the appointment of Production Tooling Service, 411 N. 23rd St., Birmingham, Ala., as their sales representative for the states of Alabama and Tennessee.

The Detroit Broach Co. of Detroit, Mich., has announced the appointment of Production Service Co., 7413 Memphis Ave., Cleveland 9, Ohio as their exclusive distributor in northeastern Ohio.



Increase your drilling output with SELLEW adjustable drill heads

In Stock

No. 0-S (2 spin.)—drill cap 1/4"
No. 0-AD (3 spin.)—drill cap. 1/4"
No. 0-D (3 spin.)—drill cap. 1/4"
No. 1-D (3 spin.)—No. 1 M. tap.
No. 2-D (3 spin.)—No. 2 M. tap.
No. 3-D (3 spin.)—No. 3 M. tap.

Send us your drilling requirements.

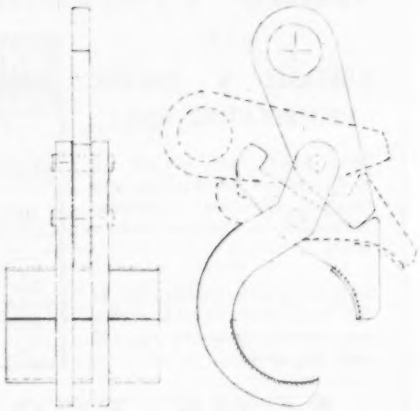
Sellew Machine Tool Co.
PAWTUCKET, R. I.

Safety Hook for Shafts is Self-Opening

By **Roy A. Sternaman**

The drawing illustrates that the engagement of the lifting bar with the lug on the shorter arm will latch the load safely around the shaft, making it impossible to drop out. The lug at the left end of this shorter shaft, working in conjunction with the lifting member makes the device self-opening.

We are handling copper tubes with our grab and have found it desirable to add rubber face liners to prevent scoring the copper. We also store our shafts in stacks with approximately one inch wooden spacers between the rows so that it is possible for the lower arm to go underneath the shaft. The drawing shows how we took advantage of this feature. It permits picking up the shaft in one grab.



V-block device aids welders

Welders at Temco Aircraft Corporation are using a unique V-block device to lay out reference points on horizontal pipe they cut and assemble in jig-building.

The V-block virtually guarantees accuracy on lay-out preparations for halving, quartering, or attaching metal pads to pipe of any diameter. In addition, the block saves lay-out time at the Dallas, Tex., plant—about ¾ manhour per shift on the average.

Welders had found it difficult to hold accuracy when making lengthwise cuts on long pieces of pipe. They could establish a centerline mark on one end of the pipe. But when they tried to mark a similar point at the pipe's other end, they had no means to insure that the two points, connected, would provide a straight line.

Welder Charles Gonday, of Dallas, found the answer at a cost of only $5.

Basically, the tool he designed is an aluminum V-block, 4½-inches wide. A 10-cent protractor is mounted on a plate attached at one end of the V-block. A movable metal pointer is fixed so that it sweeps across the face of the protractor, and a 2½-inch bubble is mounted so that it moves with the pointer.

A prick punch is inserted at the point of the V—in line with the 90-degree point on the protractor.

To establish a center line on horizontal pipe, Gonday places his V-block on one end of the pipe, sets the pointer at 90 degrees on the protractor, and adjusts the block until the bubble is centered. Then he taps the punch, which marks on the pipe one end of the centerline.

He repeats this operation at the other end of the pipe, then connects the points with a straight-edge, if the pipe is short, or by popping a line, if the pipe is long.

If he wants to cut a quarter-section of the pipe, lengthwise, he uses the line he has just drawn as one guide line. To get the other, he moves the pointer on his V-block to zero or 180 degrees on the protractor. Then he slides the block around the curve of the pipe until the bubble again is centered, and taps the punch again.

This porcedure—repeated at the other end of the pipe—provides the two terminal points for the second guide line. The lines are exactly 90 degrees, or one-quarter of the pipe's circumference, apart. The same procedure is used to halve or otherwise section pipe lengthwise.

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To Your Specifications except Screw Machine Cams

Design Assistance Offered

KIDDE PRECISION TOOL CORP.
37 FARRAND ST. BLOOMFIELD, N. J.

The simplified PYRO Optical is the ideal instrument for direct temperature readings of ANY heated object in your plant. Completely SELF-CONTAINED, PORTABLE, RUGGED, LIGHT WEIGHT (3½ lbs.) and FOOLPROOF. No correction charts, no accessories and no maintenance expenses. Unique design permits temperature determination even on MINUTE SPOTS, Fast MOVING OBJECTS and of the SMALLEST STREAMS.
Write for Catalog No. 80
THE PYROMETER INSTRUMENT CO.
New Plant and Laboratory, Bergenfield 3, N. J.

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The Genuine MAUSER **VERNIER CALIPER**

- SPECIALLY LONG VERNIER to read thousandths
- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
- 3 GRADUATIONS - 1/1000" - 1/128" - 1/10 mm in back

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Steads.

GEO. SCHERR CO., Inc. 280-MT Lafayette St., NY 12

DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

HYDROTEL LOCATING PINS

We have them in stock

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Trinity 4824
Los Angeles 21, Calif.

CUT TOOL COSTS broken tools made like new again with **NU-TANGS**

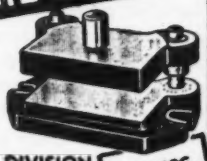
Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6)
Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!

Send them to us like this! **GUARANTEED STRONG AS NEW!** *We return them like this!*

Patent No. 2,312,093 **NU-TANGS INC.** 1331 Bates Avenue Cincinnati 25, Ohio

DANNEMAN *Precision* **DIE-SETS**



Precision-Bored on Master Plates

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ACME-DANNEMAN COMPANY, Inc.
201 Lafayette St. New York 12, N. Y.
CATALOG ON REQUEST

STOP DUST

DUSTKOPS 22 MODELS
UNIT TYPE 300 cfm to 10,000 cfm
LOW COST ¼ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

Describe problem for recommendation by return mail, without obligation

AGET-DETROIT CO.
205 Main St. Ann Arbor, Mich.

Increase Output With Special Drawing Board

By **Clifford T. Bower,** Consulting Tool Engineer

A NEW piece of equipment which should make the draftsman's job easier and increase his output has been developed. It is the universal drafting machine, a drafting board fitted with easily controlled rise and tilt mechanism carrying a drafting head which incorporates the functions of set-squares, straight edge or T-square protractor and scales.

This equipment is in use in England and Europe.

The drawing board, as generally known in the U.S., is fixed at a slight tilt, the straight edge with parallel motion, or a common T-square, is fitted. There have been some makeshift arrangements of fitting a pantograph type drafting head to an almost horizontal board, but in the whole, American draftsmen appear to be ill-equipped for producing drawings at a high rate of output.

Reduction of draftsman fatigue is the featured attraction of the universal drafting machine. If it is easy to put lines on paper, the draftsman will spend a greater amount of time in doing it, instead of taking periodic rests, during which he may claim to be thinking out his next move.

Methods engineers appear to have ignored the draftsman's work-place. The average mass production plant is swarming with experts who will adjust seating, bench heights, lights, temperature and humidity to make the job comfortable for lowly paid unskilled workers engaged in assembly or machining, but they entirely ignore the fact that highly paid designers and draftsmen are suffering acute discomfort when they are working, which consists of putting lines on a large area of paper.

Figure 1A shows a set-up similar to that used in many drawing offices. It comprises a drawing board with a fixed slope of 15 degrees to the horizontal, placed on a table of a fixed height. It illustrate a fairly comfortable posture. The man is seated and his eyes are a reasonable distance from the paper surface with the line of sight immediately over the guiding edge of the T-square. This position remains fairly comfortable provided the draftsman is not drawing lines at a distance greater than eight or nine inches from the bottom of the board.

Figure 1A

Figure 2A

Discomfort begins at about 12 inches up from the bottom edge of the board, as shown in figure B. The eyes are no longer over the pencil point and the line of sight is at an acute angle, instead of a right angle, to the board surface. In position 1-B, the draftsman cannot see the pencil point and remain seated.

When working at the top edge of the board, figure 1C, the draftsman must stand and drape himself over the board in order to see what he is doing. He must rest his elbows on the board and thereby limit the free movement of the pencil. After long periods in the position shown in 1C, he will straighten his back to relieve the strain and as soon as he does, he ceases to become productive.

Another important point arises from the three positions shown in figures 1A, 1B, 1C. The draftsman's position is governerd by his trying to place his line of sight over the pencil point and at a right angle to the drawing surface. With a board of a fixed slope, he must distort his body to suit the board. The larger the sheet of paper, the greater the contortions of the draftsman. These contortions would not be tolerated for one moment on an assembly line dealing with small components.

Board heights can be raised and stools provided to bring the draftsman higher off the floor, but with a board tilt angle fixed at 10 or 15 degrees to the horizontal, the average draftsman will still have to be a contortionist to bring his line of vision over the pencil point. The drawing equipment used necessitates the low angle tilt of the average board. A loose T-square will slide off the board faster at a greater tilt angle. If a pantograph drafting head is fitted and not provided with balancing gear, this also will slide off. The provision of adjustable drafting table legs which can be set by operating thumb nuts will enable a board to be set to suit the short or tall draftsman, but it will not avoid fatigue of working in an uncomfortable position.

The solution is to make the board adjustable to suit the man. A draftsman must be able to roam freely over the

Figure 1B

board so that a small portion in the top left hand corner can be projected and drawn from another angle in the bottom right hand corner and he should be able to do this without effort.

Figure 2B

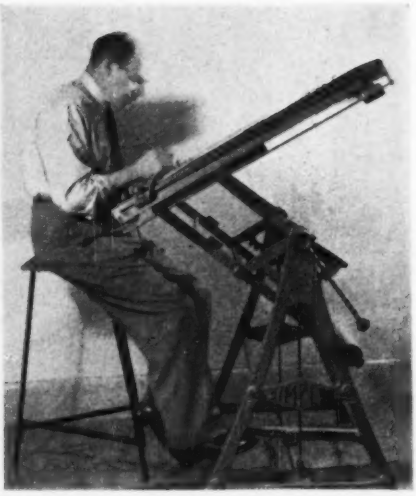


Figure 3A

In figure 2A, one of the latest types of universal drafting machines is shown with the draftsman working at the bottom edge of the board, and working in

Figure 3B

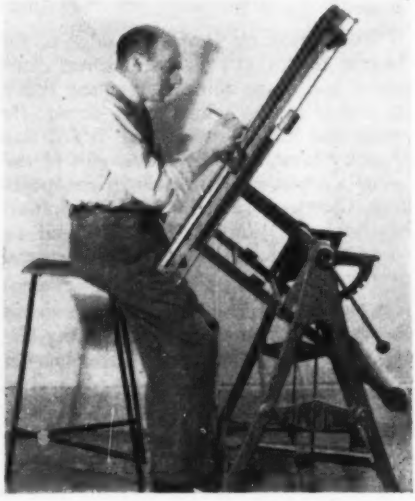


Figure 1C

Figure 3C

the center of the board, at 2B, while sitting in a standard office chair. These two illustrations merely serve to show that the seating position is not important when using a board with universal movements.

Figures 3A, 3B, 3C, shows views of the draftsman using the universal while provided with a lightweight stool of about 30" in height. He is working at the bottom, center and top of the board. At all times he is enjoying perfect visibility because the board position has been adjusted to suit him.

The positions of the board can be adjusted by lifting or pushing downward. There are no locking devices needing operation. Board height is adjusted by these movements, but tilt adjustment requires the depression of the foot pedal at the bottom center of the floor stand. This action pulls a pair of latches free from the notches cut in the peripheres of the particircular quadrants, as shown in figure 3B, so that the board assembly can be rotated about the pivot support. Release of pressure on the pedal allows the latches to spring back into the notches on the quadrants.

A straight-edge spans the board and can be traversed up and down while guided in a parallel path by a pair of helical toothed racks secured to the board's vertical edges. A pair of fiber pinions engages with the rack teeth and is secured to each end of an axle running through the core of the straight edge, thus giving a motion similar to that of a parallel ruler fitted with knurled rollers and running over a paper surface. The weight of the straight edge is counterbalanced by suitable weights sliding on circular rods secured to the underside of the board edges.

The principle behind the development

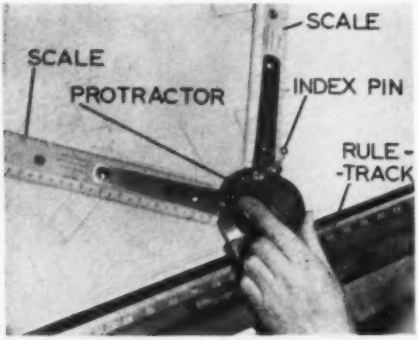


Figure 4

of the universal drafing head is to eliminate the wasteful process of handling set-squares, protractors and squares. Figure 4 shows an example. The straight edge incorporates a thick steel rule in its construction to act as a single rail track for the protractor head. The head comprises a protractor scale around which may be revolved the pair of rules or scales, fixed at a right angle to one another. The rules are calibrated on both edges and can form full and half-scales combined, or metric and inch scales as shown in the illustration. The central knob can be turned with the finger tips when the index pin is lifted. The index pin engages with a series of holes drilled through the protractor so that the scales may be set to make various standard angles with the straight edge. Any angle on the protractor scale can be pre-set independently of the indexing holes.

The head illustrated in figure 4 combines the functions of set-squares, protractor and scales. For most jobs the only extra tools needed are compasses and a pencil.

Tests indicate that about 20% of the draftsman's time can be saved when using the universal drafting machine.

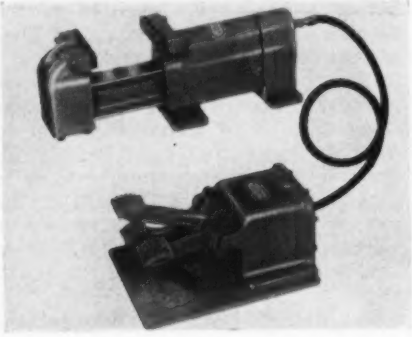
The End

Improved bench vise and press

An improved hydraulic bench vise and press has been announced by Railcens, Dept. BB, 120 N. Wisner St., Jackson, Mich.

Vise has interchangeable jaw plates with divided front head for punching, broaching, and removing gears, pulleys, etc., from long shafts.

Special jaw plates can be made for bending, forming and pressing. Unit can be used as a vise, horizontal or up on end to use as arbor press. Pump will build pressure up to 5000 psi.



Use ACTION Card, opposite page 64. Encircle No. 95

Keyseat cutter has tapered shank, special surface treatment

A new style keyseat cutter has been added to the regular line of Quality Tool Works, Dept. B, Waukegan, Ill. Features of new addition are: tapered shank, premium grade hss, and a special surface treatment after the cutter is finish ground.

In use the cutter shank is locked into a special holder which will fit any standard milling machine. This driving arrangement is claimed to provide a rigid and true-running setup which promotes accuracy and long cutter life.

Cutters are available in 41 standard sizes from stock, or special sizes made to order.

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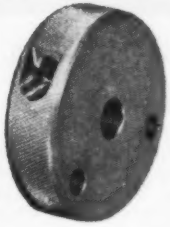

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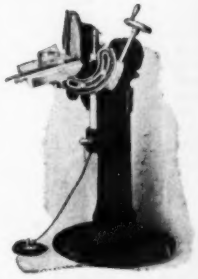

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Surface Cutting Speeds for Various Grades of Cold Drawn Steel on Automatic Screw Machines

Speeds given below are approximate and are to be used only as a basis from which proper speeds for the part may be calculated. The figures represent the averages for the general run of parts made from cold drawn steel. Any extraordinary features in the part to be made should be taken into consideration and speeds altered accordingly. (Grades not listed may be interpolated from the speed and feed values of the listed grades most similar in chemistry.)

FREE CUTTING STEELS

A.I.S.I. No.	S.A.E. No.	Surface Feet Per Minute	% Relative Speed Based on A.I.S.I. B1112 (S.A.E. 1112) as 100%
B1111	1111	155	94
B1112	1112	165	100
B1113	1113	225	136
C1108	—	135	81
C1109	—	135	81
C1113	—	165	100
C1115	1115	135	81
C1116	—	155	94
C1117	1117	150	91
C1118	1118	150	91
C1119	1119	165	100
C1120	—	135	81
C1125	1125	135	81
C1137	1137	120	72
C1138	1138	125	76
C1140	1140	120	72
C1141	1141	115	70
C1141*	—	135	81
C1144	—	125	76
C1144*	—	140	85
C1145	1145	110	66
C1145*	1145	130	79
C1146	1146	115	70
C1151	1151	115	70
C1151*	1151	135	81

CARBON STEELS

C1008	1008	110	66
C1010**	1010	120	—
C1012**	—	120	—
C1015	1015	120	72
C1016	1016	130	78
C1017	1017	120	72
C1019	—	130	78
C1020	1020	120	72
C1022	1022	130	78
C1023	—	125	76
C1025	1025	120	72
C1030	1030	115	70
C1035	1035	115	70
C1040	1040	105	64
C1043	—	105	64
C1045	1045	95	57
C1045*	1045	120	72
C1050	1050	90	54
C1050*	1050	115	70
C1055*	1055	85	51
C1060*	1060	85	51
C1065*	1065	80	49
C1070*	1070	80	49
C1078*	1078	75	45
C1080*	1080	70	42
C1085*	1085	70	42
C1095*	1095	70	42
B1010	—	130	78

ALLOY STEELS

1320	1320	95	57
1330*	—	100	60
1335*	—	100	60
1340*	—	95	57
2317	2317	110	66
2330	2330	90	54
2330*	2330	115	70
2335	—	85	51
2335*	—	115	70
2340*	2340	95	57
2345*	2345	85	51
E2512*	—	85	51
2515*	2515	85	51
E2517*	—	85	51
3115	3115	110	66
3120	3120	110	66
3130	3130	95	57
3130*	3130	120	72
3135	3135	90	54
3135*	3135	115	70
3140	3140	70	42
3140*	3140	110	66
3141	3141	65	40
3141*	3141	105	64

*annealed

**light feeds

Courtesy: Republic Steel Corp. Union Drawn Steel Division

Surface Cutting Speeds for Various Grades of Cold Drawn Steel on Automatic Screw Machines

Speeds given below are approximate and are to be used only as a basis from which proper speeds for the part may be calculated. The figures represent the averages for the general run of parts made from cold drawn steel. Any extraordinary features in the part to be made should be taken into consideration and speeds altered accordingly. (Grades not listed may be interpolated from the speed and feed values of the listed grades most similar in chemistry.)

ALLOY STEELS

A.I.S.I. No.	S.A.E. No.	Surface Feet Per Minute	% Relative Speed Based on A.I.S.I. B1112 (S.A.E. 1112) as 100%
3145*	3145	105	64
3150*	3150	100	60
E3310*	3310	85	51
E3316*	—	80	49
4017	4017	130	78
4023	4023	130	78
4024	—	130	78
4027	4027	110	66
4028	—	120	72
4032*	4032	125	76
4037*	4037	120	72
4042*	4042	115	70
4047*	4047	110	66
4063*	4063	85	51
4068*	4068	80	49
4130*	4130	120	72
E4132*	—	120	72
E4135*	—	115	70
E4137*	—	115	70
4137*	4137	110	66
4140*	4140	110	66
4142*	—	110	66
4145*	4145	105	64
4147*	—	105	64
4150*	4150	100	60
4317*	—	100	60
4320*	4320	100	60
4337*	—	90	54
4340*	4340	95	57
4608	—	110	66
4615	4615	110	66
E4617	—	105	64
4620	4620	110	66
E4620	—	105	64
4621	—	110	66
4640*	4640	110	66
E4640*	—	85	51
4812*	—	85	51
4815*	4815	85	51
4817*	—	80	49
4820*	4820	80	49
5045*	—	115	70
5120	5120	125	76
5130	—	95	57
5132*	—	120	72
5135*	—	120	72
5140*	5140	115	70
5145*	—	110	66
5147*	—	110	66
5150*	5150	105	64
5152*	—	105	64
E50100*	50100	70	42
E51100*	51100	65	40
E52100*	52100	65	40
6120	—	95	57
6145*	—	110	66
6150*	—	100	60
6152*	—	100	60
8615	—	115	70
8617	—	110	66
8620	—	110	66
8622	—	110	66
8625	—	105	64
8627	—	105	64
8630*	—	120	72
8632*	—	120	72
8635*	—	115	70
8637*	—	115	70
8640*	—	110	66
8642*	—	110	66
8645*	—	105	64
8647*	—	100	60
8650*	—	100	60
8655*	—	95	57
8660*	—	90	54
8720	—	110	66
8735*	—	115	70
8740*	—	110	66
8742	—	110	66
8745*	—	105	64
8747*	—	100	60
8750*	—	100	60
9255*	—	90	54
9260*	—	85	51
9261*	—	80	49
9262*	—	80	49
E9310*	—	85	51
E9315*	—	80	49
E9317*	—	80	49
9437*	—	110	66
9440*	—	110	66
9442*	—	110	66
9445*	—	105	64
9747*	—	105	64
9763*	—	90	54
9840*	—	85	51
9845*	—	80	49
9850*	—	75	45

*annealed

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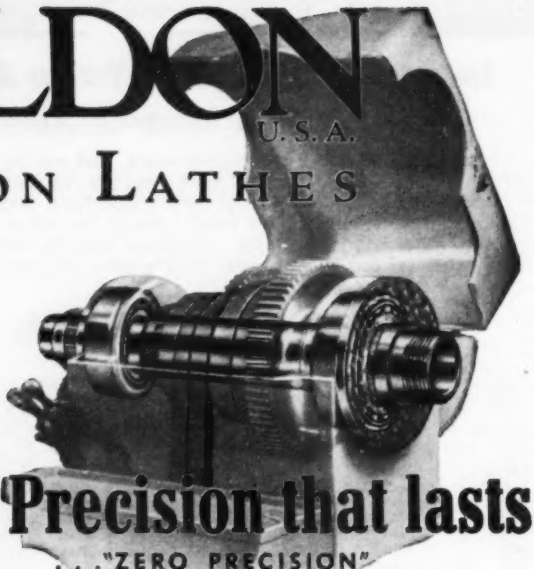

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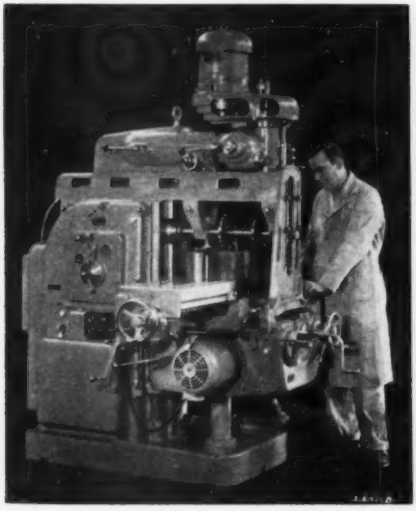
What's New

Multi-purpose milling machine added to line

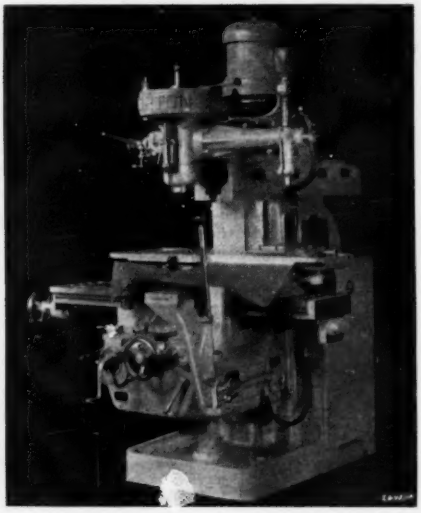
The George Gorton Machine Co., 1321-S Racine St., Racine, Wis., has announced the addition of a horizontal-vertical-universal milling machine to its standard line.

Basically this machine is a heavy-duty No. 2 or medium-duty No. 3 horizontal mill with a "receptor ram" in place of the conventional overarm. This receptor ram accommodates the standard Gorton

1. Gorton 2-28 horizontal mill with full-width knee and receptor ram with super-speed universal head and ram assembly. Machine is shown arranged for straddle milling.



2. The 3-34 horizontal mill with full-width knee equipped with receptor ram, super-speed plain vertical head and ram assembly, duplicator table and tracer head.



arbor supports and arbor support brace.

For face milling, the arbor supports and brace are removed, together with the arbor. Then, the receptor ram is moved to the rear until its front end is flush with the column face.

For super-speed vertical or angular milling, the receptor ram remains in the rear position and the universal head and ram assembly is moved forward to cutting position. In this way, three kinds of milling operations can be performed on the same machine without disturbing the work on the machine table.

The full-width knee with a bearing surface 24½" wide is claimed to provide exceptional rigidity approaching that of a bed-type machine.

The horizontal spindle has a speed range from 25 to 2000 rpm, which makes it good for carbide cutters and climb milling. By attaching a heavy-duty vertical attachment on the machine parking bracket, roughing cuts can be taken within the same speed ranges. Then, for finishing, the vertical attachment is swung aside and the super-speed universal head and ram assembly is moved into position which provides speeds up to 5600 rpm.

The spindle has a vertical feed of 3½" and is operated either by a hand feed lever or worm and worm wheel micrometer feed crank.

The universal head can be swiveled left, right, front and back respectively: 45°, 45°, 45°, and 30°. It is positioned by hand levers through worms and worm wheels and settings are made with the help of large graduated dials.

The same type of machine but with a super-speed plain vertical head and ram assembly has spindle speeds available up to 4000 rpm. In addition to hand lever and micrometer crank feed, power feed can be furnished. Also with this vertical head, end measuring rods and dial indicators can be installed for jig boring. A tracer head and duplicator table can be installed for manual duplicating.

Use ACTION Card, opposite page 64. Encircle No. 1

The Bullard Co. Announces Two New Lines of Machines

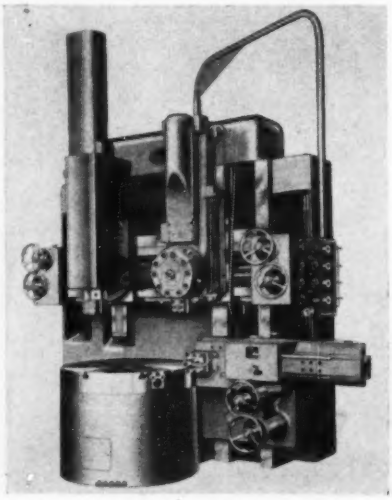
The Bullard Co., Bridgeport 2, Conn., originators of the side-head vertical turret lathe, have announced a completely re-designed version of this type of machine tool and also a new table type horizontal boring, milling and drilling machine. Appropriate to the company's 75th anniversary year in 1955, the machines will be identified as the Cut Master Model 75 and the Model 75 boring, milling and drilling machine.

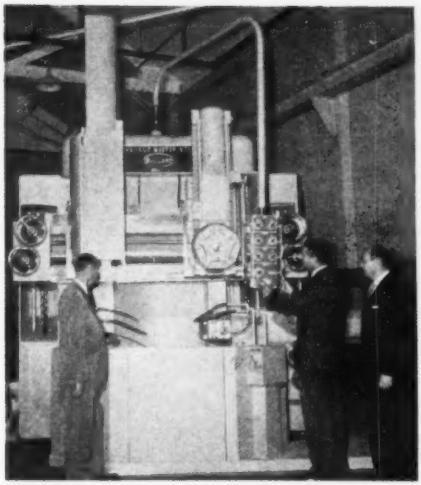
A feature of the lathe is the unique hydraulic shifter unit which makes it possible to control all functions of the machine from a single, movable pendant station. The pendant incorporates the use of directional lever action instead of push buttons, for ease of operation and operator safety. For example, if a feed or traverse lever is engaged to the left the motion of the head is to the left. The full range of 20 table speeds and 16 feeds is obtainable through the use of dials on the side of the pendant.

The table support bearing is a combination radial and thrust roller bearing. This feature is claimed to afford greater accuracy at higher rates of speed.

The Cut Master Model 75 can be con-

The new Cut Master vertical turret lathe Model 75, available in six sizes.





E. C. Bullard, president of the Bullard Co., (left), and L. J. Baudis, vice-president in charge of manufacturing, look on while F. U. Hayes, vice-president—sales manager, tries out the controls of the new design Cut Master.

verted from a manually operated machine to one which is completely automatic by the installation of the Bullard Man-Au-Trol attachment. This unit may be purchased with the machine or applied in the field as production requirements dictate without detracting from the manual versatility of the machine, the manufacturer claims.

Other attachments which are available include hydraulic chucking mechanism, angular turning, thread cutting and drum scoring devices and variable speed drive. The machine can also be adapted to single or double dimensional contouring controls.

Unit type construction of machine components and smooth external lines for cleanliness and simplification of maintenance have been stressed by Bullard designers. Built in the following table sizes: 26", 36", 46", 56", 66" and 76"—with a variety of head combinations.

The paramount feature of the new design Model 75 table type horizontal boring, milling and drilling machines is the pendant control. All functional controls of the machine are operated from this movable pendant station: directional feed and traverse control of the spindle, head, table and saddle, selection of feed and speed rates, spindle direction of rotation, and head binders.

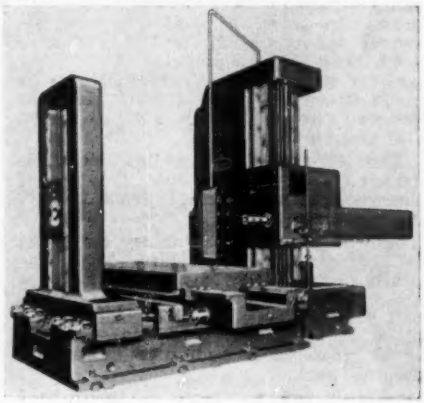
Having both a screw and a rack feed for the spindle is claimed to make possible a smooth, steady power feed for boring as well as a sensitive hand feed action for small drilling and tapping. The selection of the type of feed desired is by means of a selector switch on the front of the head.

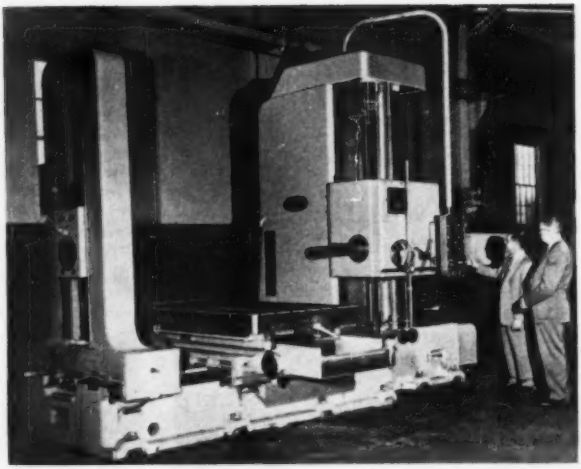
The weight and proportions of the new head post and head are considerably greater than the previous model. The head post is a massive box section for its full height, providing greater rigidity for the head at its highest operating position. The result is claimed to be less head deflection and greater ability to absorb shock, enabling the machine to take heavy cuts and feeds without sacrificing accuracy.

An optical measuring device is provided for the head and table, which enables the operator to quickly and accurately set the head or table to any desired position.

Standard features include feeds in inches per revolution and inches per minute for all motions, automatic depth knockout for spindle, hydraulic counterbalance for head and massive rear post for supporting extension boring bars. Accessories such as continuous feed facing heads, right angle milling attachments, thread cutting attachment, coolant system

Bullard horizontal boring, milling and drilling machine with optical measuring device for table and head.





Pendant control on new horizontal boring, milling and drilling machine has the attention of M. K. Peck, assistant sales manager (left) and C. Harold Anderson, chief engineer.

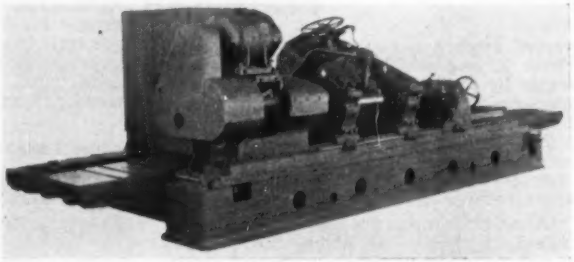
and boring bars of all types are available as extra equipment.

These machines are available in three sizes: 3", 4" and 5" dia. spindles with a wide range of head post heights, bed lengths, and table sizes.

Use ACTION Card, opposite page 64. Encircle No. 2

Roll grinding machine for rolls up to 25,000 lb.

A roll grinder for rolls weighing up to 25,000 pounds has been announced by Landis Tool Co., Dept. BB, Waynesboro, Pa.



In operation, the wheel is traversed across the face of the roll. Crowning and concaving of rolls can be done to precision limits. In addition, a swivel table under the work head and footstock permits grinding of tapers. Grinder is made to swing 36" dia. work. Lengths between centers are 120", 144", 168", 192", 216" and 240".

The 36" diameter grinding wheel is driven from a 40 hp motor. Traverse of the wheel head is variable from 2 to 100 inches per minute.

Crowning and concaving are easily set at the rear of the machine. Mathematically accurate curves on repeat settings are claimed. Work speeds of the vee belt driven headstock are variable from 12 to 100 rpm. Work drive is 7½ hp or 10 hp depending on the diameter of the roll neck.

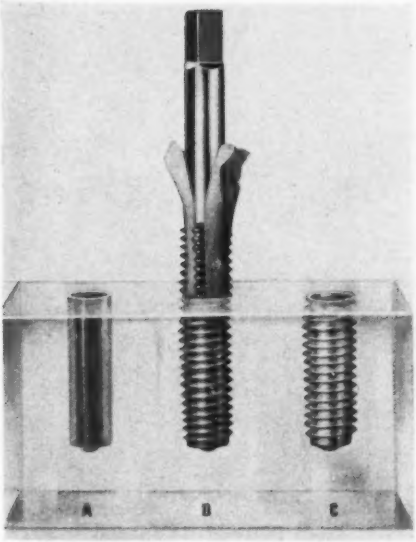
Use ACTION Card, opposite page 64. Encircle No. 3

Wax insert facilitates blind-hole tapping

A hard wax insert that is said to eliminate annoyances of blind-hole tapping is being marketed under the name of Tap-Cartridge by the Tap-Cartridge Co., Dept. BB, 10167 Springfield Pike, Cincinnati 15, Ohio.

Available for tap sizes from No. 6 up and for any depth of drilled hole, the insert, it is claimed, prevents torn threads, increases tap life, and facilitates thread cutting to the bottom of a hole without cleaning-out delays.

Illustration shows the manner in which



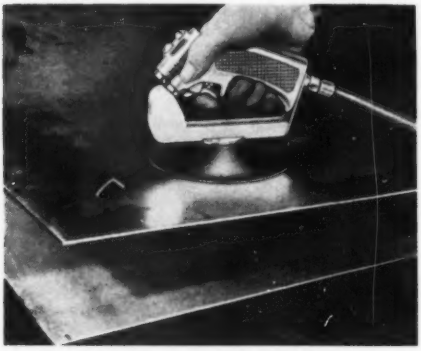
a blind hole is tapped using the insert: (A) Tap-Cartridge inserted; (B) hole is tapped through Tap-Cartridge with chips being embedded in the wax and forced up and out of the hole; (C) completed tapped hole.

Use ACTION Card, opposite page 64. Encircle No. 4

Sheet lifter produces vacuum from compressed air

As long as the trigger in the pistol grip type handle of the Pres-Vac lifter is held down, the suction cup will pull 11 pounds per square inch.

This lifting power is produced by passing compressed air through the venturi at 45 pounds per square inch, creating a constant vacuum of 22 inches of mercury. The vacuum is conveyed to the rubber cup through passages in the handle. A regulator is supplied to reduce the line pressure to 45 p.s.i.



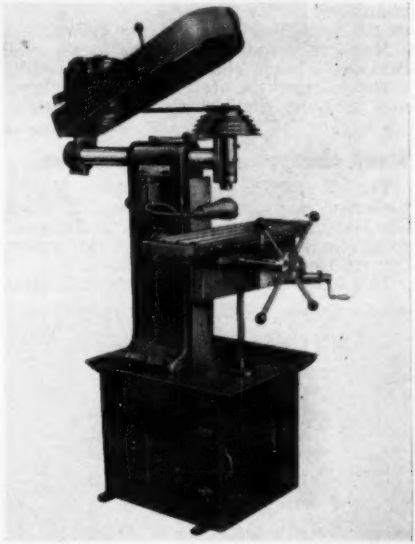
Applications include any object that has a flat surface on which a vacuum can be maintained. F. J. Littell Machine Co. Air Division, Dept. B, 4555 N. Ravenswood Ave., Chicago 40, Ill.

Use ACTION Card, opposite page 64. Encircle No. 5

Vertical miller has rack feed, production attachment

Model VM-1R vertical milling machine, manufactured by Growingshield-Harris C., Dept. BB, Greenfield, Mass., features rack feed and production milling attachment.

It is available with Crowningshield head, with Bridgeport M head, or without head, if desired. Longitudinal feed is

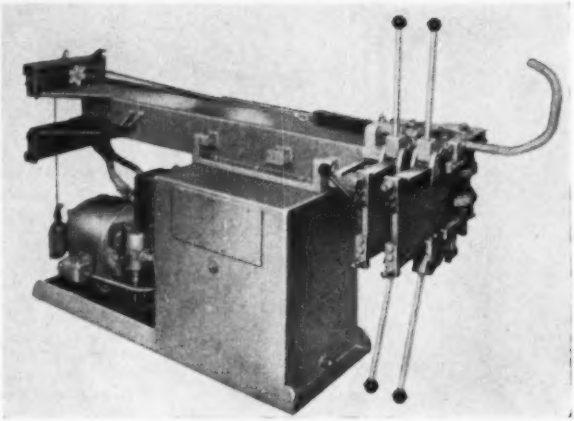


20″; vertical feed, 15″ with Crowningshield attachment, 13½″ with Bridgeport attachment.

Heavy-walled castings with wide ways are claimed to insure rigid support of working parts. The table, 8⅛″ x 28″, is supported by a saddle bearing surface of 117 sq. in. Additional strong lateral support is mounted inside the cabinet base.

Use ACTION Card, opposite page 64. Encircle No. 6

Two-way bending machine



A horizontal semi-automatic tube bending machine, Series 1400-A, designed for both clockwise and counter-clockwise operations, has been announced by Pines Engineering Co., 699 Walnut St., Aurora, Ill.

It is designed with an extended main spindle and double ways mounted on the top and bottom of both the stationary and swinging arms. The unitized head and top assembly is doubled hinged to the base which permits turning over the entire assembly 180°. This feature permits handling bending operations in either direction and interchanging tooling quickly, or the mounting of secondary tooling.

Machine handles up to 1" o.d. steel tubing. It has a self-contained hydraulic system, lever-operated toggle type clamp and pressure die holders, manual angle-of-bend selector with either direction six or eight position turret and a three hp ball bearing motor.

Use ACTION Card, opposite page 64. Encircle No. 7

Scrap chopper eliminates pressure

The Birtwell scrap chopper, Northeastern Development Engineers, 21 High St., Dept. 15, Pawtucket, R.I., is designed to eliminate jamming of the feed system for roll stock on punch presses.

The complete unit is suspended to float freely from its base. With waste stock passing through the cutting slot, the chopper rocks down with the jump of the stock, cuts, then rocks back up for more scrap. The manufacturer claims that back pressure is eliminated, stock is not bowed.

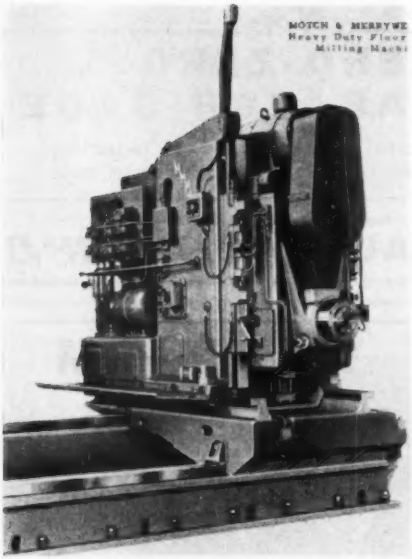
Lightweight and portable, the unit can be moved from press to press as needed. Heavy duty cutters are interchangeable. Stock up to 3" wide x .050" thick can be accommodated.

Use ACTION Card, opposite page 64. Encircle No. 8

Heavy duty floor type milling machine

A heavy duty floor type milling machine, designed for use in conjunction with special milling equipment on M-48 tank hull prdouction, has a bed of heavy normalized steel fabrication, to which large cast iron ways have been mounted. These ways carry the saddle, upon which is mounted a housing raving vertical ways for mounting the horizontal spindle milling head.

Hydraulic cylinders are provided to feed the saddle at a variable rate on the main bed. The housing is positioned hydraulically on the ways provided on the saddle. A special barrel type multiple stop is supplied to position the movement of the housing forward to predetermined



locations. Milling head feed vertically in either direction is arranged hydraulically. All sliding way surfaces have nonmetallic liners.

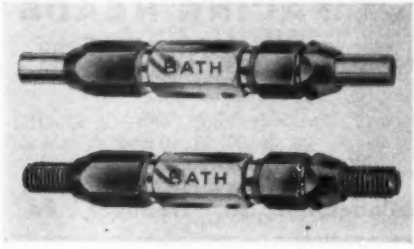
Milling head is the single speed type with additional speeds available through a multiple V belt with large bull gear, providing flywheel action to the spindle. Motch & Merryweather Machinery Co., Dept. BB, 1250 E. 222nd St., Cleveland 17, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 9

Reversible gages are economical

A new line of thread and cylindrical reversible gages is claimed to cut gaging costs.

They are made from selected steel; have a luster-lapped finish; are adjustable for use as depth gages, and have go and not go color identification. John Bath & Co., Inc., 14 Grafton St., Worcester 8, Mass.

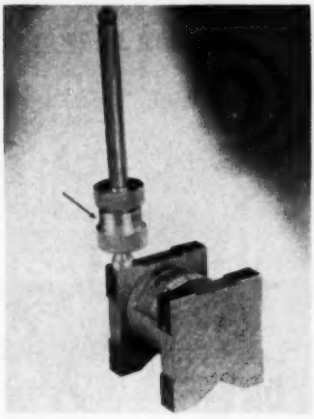


Use ACTION Card, opposite page 64. Encircle No. 10

Magnetic base now has universal joint swivel

Added convenience and time saving in positioning dial indicator gages is claimed to be achieved by the universal joint shaft, pictured. It permits a 180° swing on a vertical plane and a 360° swing on a horizontal plane.

Known as the "Minute Man," this magnetic base reportedly allows a wider range of application (in many places hitherto inaccessible) and makes for



easier, more accurate gage readings. The base does not have to be repeatedly repositioned in order to get various gage readings. The ball and socket arrangement is simply swung to any desired position and locked securely by the large knurled nut. The shaft fits into each of the three positioning holes in the magnetic base. Base is magnetized and ground square on all four sides. The du Mont Corp., Dept. BB, Greenfield, Mass.

Use ACTION Card, opposite page 64. Encircle No. 11

Larger air cylinder in drilling unit

The automatic drilling unit made by the Electro-Mechano Co., 263A East Erie St., Milwaukee, Wis., has been redesigned.

A larger air cylinder is used and both it and the hydraulic resistance unit are now mounted in line with the spindle. Freed travel is accomplished in the hy-

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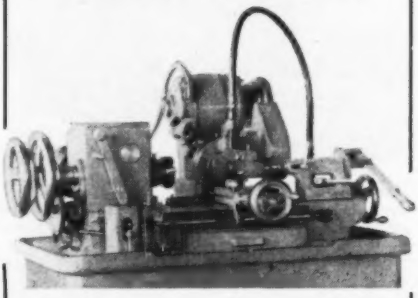


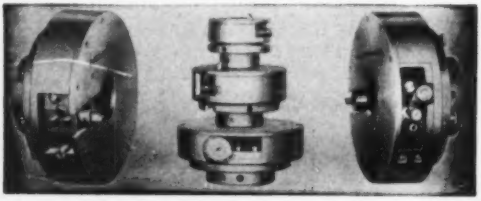
THREAD MILLING MACHINE

Ask for supplementary sheet describing the improvements and having an engraving showing the complete machine.

Write for Illustrated Bulletin

WALTHAM MACHINE WORKS

WALTHAM MASS.



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with Automatic Feed

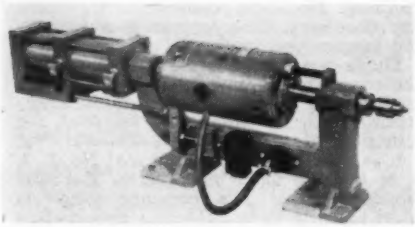
One-way Tool Feed—6, 9 and 10" sizes.

Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.



draulic system to eliminate hammering.

These improvements are claimed to make a more positive and smoother feeding unit so that the smallest drills can be handled.

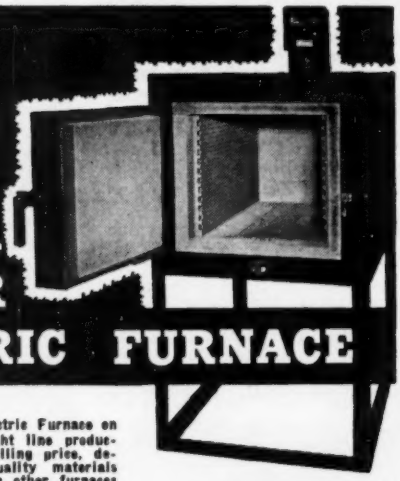
Use ACTION Card, opposite page 64. Encircle No. 12

Grinding coolant dissolves rapidly

A new grinding coolant, "Triple C," is being marketed by the Motch & Merryweather Machinery Co., cutting tool mfg. div., Dept. BB, 1250 E. 222nd St., Cleveland 17, Ohio.

For all wet grinding operation, the coolant may be put directly into water

SAVE 3 WAYS WITH A LUCIFER ELECTRIC FURNACE



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in the grinder, where dissolving can take place in as little time as two minutes.

Triple C is compatible with heat-treating salts, is claimed to make stable solutions, maintain properties in hard water. Solutions are transparent; they reportedly have no emulsifying action on oils or deterrent effect on lubricated parts of machines. Product is available in 9-lb. and 50-lb. pails or in 150-lb. steel drums.

Use ACTION Card, opposite page 64. Encircle No. 13

Equalizing and locking sling

The Caldwell Adjust-A-Leg equalizing and locking sling is claimed to simplify the job of lifting unequal or unbalanced loads.

The crane operator can quickly find the correct lift point because the sling legs are self-equalizing and lock automatically. A new sling of 50-ton capacity has recently been added to the line of eight sizes ranging from ¾-ton to 28-ton capacity. The Caldwell Co., Inc., Dept. BB, 3411 Auburn St., Rockford, Ill.

Use ACTION Card, opposite page 64. Encircle No. 14

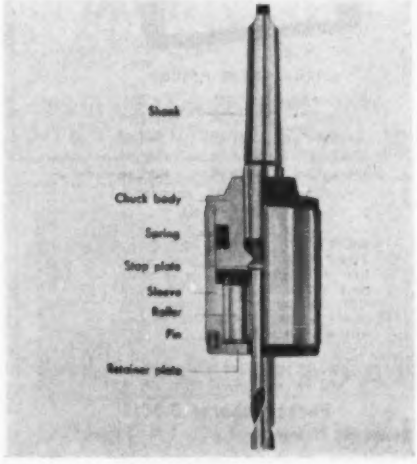
Self-centering drill chuck permits change of tools while machine is running

The Centric Tool Co., Dept. BB, Rockford, Ill., is offering a new self-centering drill chuck that is claimed to permit change of drills, reamers, and other straight shank tools while machine is running. No keys, collets, or wrenches are necessary. The grip is increased as the torque load increases.

Three precision ground rollers replace the conventional type jaws. There are no interlocking parts. According to the manufacturer, drill chuck can be used for either light or heavy production drilling.

It is available with shanks of No. 1, 2, 3, or 4 Morse taper; one special and four standard sizes. The capacity range is from 1/32" up to ¾". The chuck diameters range from ⅛" up to 2¾". Chuck lengths are from 1 7/16" up to 3¾".

Use ACTION Card, opposite page 64. Encircle No. 15

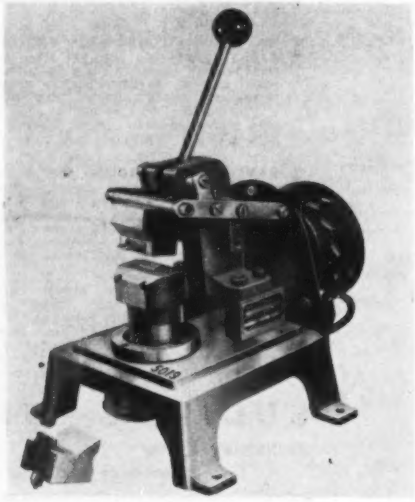


Electric bench branding machine

An electric bench brander, suitable for heat branding small parts or components of wood, leather, rubber, Bakelite or similar plastics, has been introduced by Geo. T. Schmidt, Inc., Dept. B, 1802 Belle Plaine Ave., Chicago 13, Ill.

Trade marks, parts numbers, patent data, etc., are imprinted through the application of a heated die. An electric heating cartridge is mounted in the machine head and uniform heat is obtained by thermostat control. This precludes danger of overheating the die.

Dies for this type of branding are cut with deep sharp characters which are claimed to require minimum pressure. The lettering dies are interchangeable, thus the machine may be used for branding a variety of small parts simply by



altering the holding fixture.

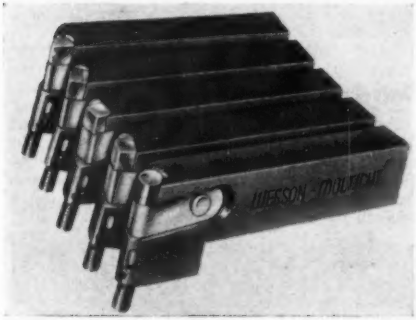
The brander may be equipped with an electric timing device which signals the required length of the dwell period.

Use ACTION Card, opposite page 64. Encircle No. 16

Tool holders now feature height gage, insert removal slot

A new design feature for more rapid insert setup, the band type Multicut tool holder now incorporates a precision ground carbide height gage. Permanently brazed to the holder adjacent to the insert slot, the flush gage is claimed to eliminate the need for additional rules or gages.

The operator raises the insert until it



is flush with the gage. By feeling the top of the insert and flush gage with the finger tip, he can set the insert accurately to 1/1000".

Another new feature is an elliptical slot for easier insert removal. Wesson Co., Dept. B, 1220 Woodward Heights Blvd., Detroit (Ferndale 20), Mich.

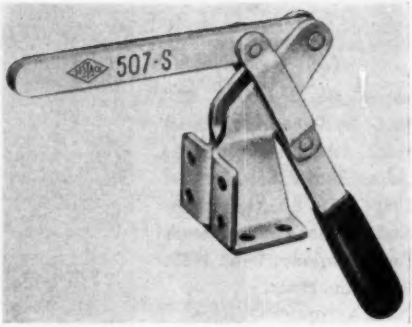
Use ACTION Card, opposite page 64. Encircle No. 17

Toggle clamps feature low silhouette, complete clearance

Low silhouette and complete clearance are claimed to be the two main features of the Destaco Model 507 toggle clamps, Detroit Stamping Co., 347 Midland Ave., Detroit, Mich.

Specially designed to hug the fixture and with a flop-over action which flicks the spindle and holding bar completely away from the working surface, the low silhouette facilitates work insertion and removal.

Complete clearance is useful where



sheets of metal or plastic are positioned for light-duty processing. As the spindle and holding bar lie flat and well away from the working area when opened, there is little chance for injuring the clamps from contact with heavy suspended production tools.

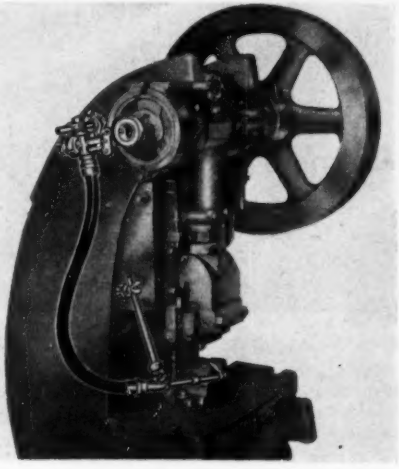
Use ACTION Card, opposite page 64. Encircle No. 18

Delayed action air blast valve

A delayed action air blast valve has been introduced by F. J. Littell Machine Co., 4147 No. Ravenswood Ave., Chicago 40, Ill.

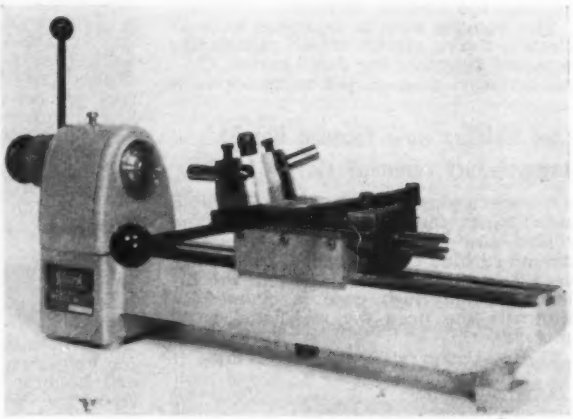
Valve is built to blow after cam has passed over the roller. This delayed action is required on compound blanking dies and similar jobs where stamping is freed right at the top of the press stroke.

Use ACTION Card, opposite page 64. Encircle No. 19



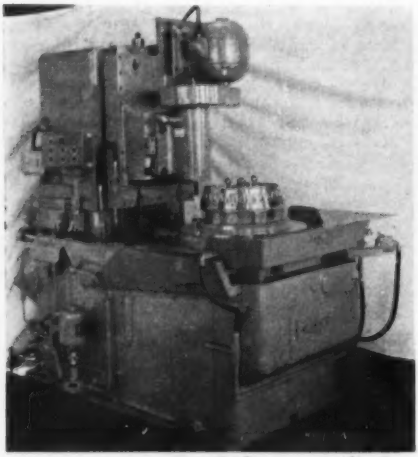
Model No. 2 lathe, 22" bed, ball bearing headstock with lever collet closer and V belt, Pt. No. 23804. All castings are made of meehanite. Stark Tool Company, Dept. MTB, Waltham, Mass.

Use ACTION Card, opposite page 64. Encircle No. 20.



Special-purpose automatic miller

Two distinguishing features of the Producto Mill-Matic, a special-purpose production milling machine, are of special interest. They are: (1) a rise and fall cutter head slide, and (2) a horizontal



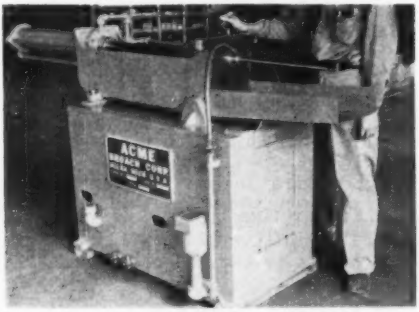
work table with integral index mechanism.

Horizontal, vertical and multiple spindles may be used in many combinations. The Producto Machine Co., Dept. B, 990 Housatonic Ave., Bridgeport 1, Conn.

Use ACTION Card, opposite page 64. Encircle No. 21

Universal broaching and press unit

Acme Broach Corp., Platt St., Milan, Mich., is offering a new type hydraulic machine designated as the "Flex-O-Broach," a universal unit suitable for use in horizontal or vertical position. It is adaptable for horizontal pull broaching,



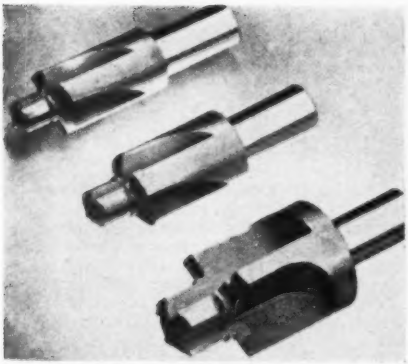
vertical pull down broaching, push broaching, crimping and assembling.

The unit has a full 24" stroke and is available in two capacities, a 2 ton horizontal, 3 ton vertical capacity and a 4 ton horizontal, 6 ton vertical capacity. Stroke of machine is adjustable by means of stop dogs.

Use ACTION Card, opposite page 64. Encircle No. 22

Cutters with carbide tips

A line of carbide-tipped combination reamer, counterbore and facing tools has been announced by the Wetmore Tool



& Engineering Co., Dept. BB, 5318 E. Washington St., Los Angeles 22, Calif.

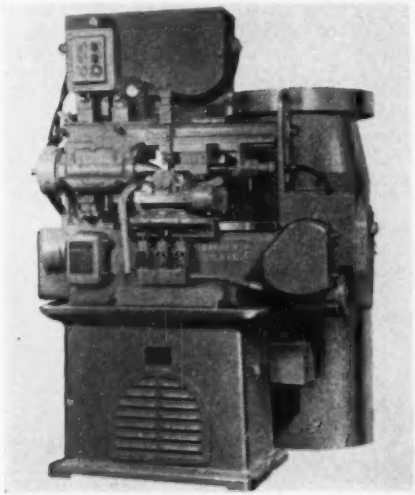
Tools are used for forming the standard female fitting specified in the AND-10050 design standard. They are made in two styles, one for drill presses, the other for screw machine or turret lathe use. Four operations are combined in one tool.

Use ACTION Card, opposite page 64. Encircle No. 23

Automatic hobbing machine cuts automatic transmission gears

Barber-Colman Co., Dept. B, Rockford, Ill., has announced an automatic hobbing machine, No. 6-10, tooled for cutting automatic transmission gears on a high production basis. The machine is a horizontal type with solid overarm for maximum rigidity. It operates automatically through a combination of mechanically hydraulic and electrical movements. Feed, index and hob speed are mechanically governed through a gear train and change gears. The work slide movements, automatic clamping and arbor-loading are hydraulically operated, while cycling and rapid traverse are electrically actuated. Automatic loading is accomplished through a vibratory hopper-feed system.

Use ACTION Card, opposite page 64. Encircle No. 24



Hydra-feed enters automatic lathe field

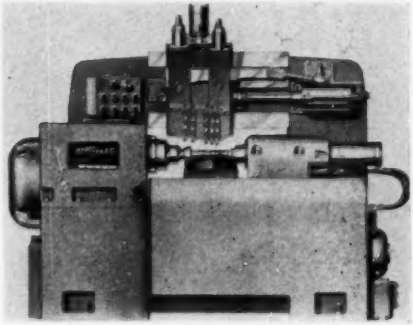
Designed for automation, maximum carbide performance, high rates of metal removal, and automatic chip removal, a new line of automatic lathes has been announced by Hydra-Feed Machine Tool Corp., Dept. MTB, 730 W. Eight Mile Rd., Ferndale, Mich.

Although many of the features of the new Hydra-Feed lathe line represent innovations in lathes designed for commercial production, they are not strictly new. Most of them have been employed for several years on the special machines built by the company.

The direction of rotation is reversed from normal practice. This has made possible the elimination of all the usual tooling from the front of the machines—resulting in an unobstructed loading area.

Combined cutting speeds and feeds giving metal removal rates as high as 52 lbs. per minute are claimed. Spindle speeds are infinitely variable and range from 82 to 2400 rpm on Model HD-8, from 98 to 1475 on Model HD-12 and from 66 to 1072 rpm on the larger models.

Use ACTION Card, opposite page 64. Encircle No. 25



Gardner No. 125-30" Double Spindle Grinder

The equipment includes hydraulic head closing attachment complete with all necessary controls, hydraulically operated sliding work table with necessary controls, wet grinding system, and rotating type fixture to accommodate above size brake band.

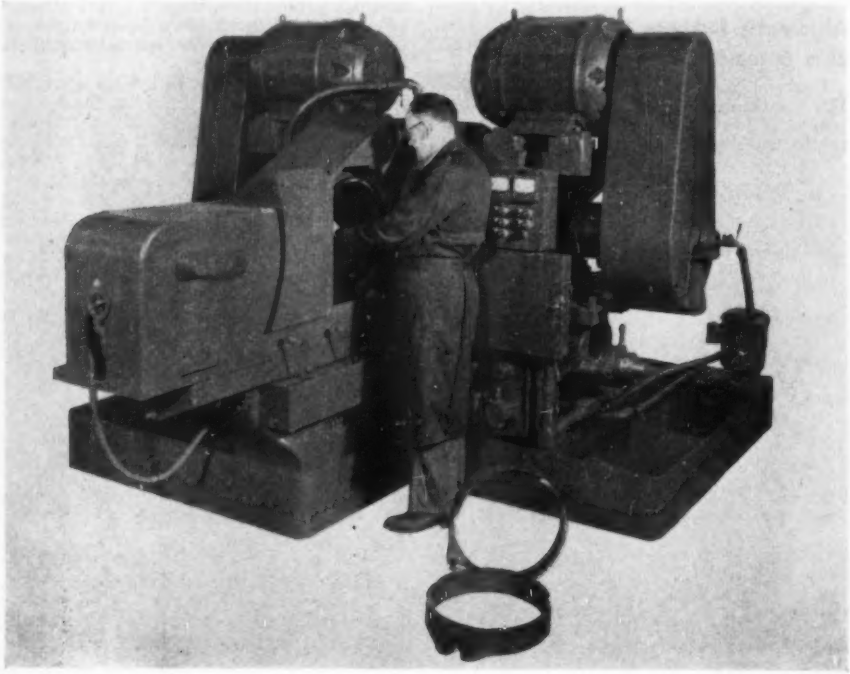
The spindles are 3.937" in dia. in the bearings at the wheel collar end. Antifriction bearings are used and special provision is made to exclude dirt and grit from the bearing chambers. The spindles are driven through V-belts from motors mounted directly above upon hinged motor plates.

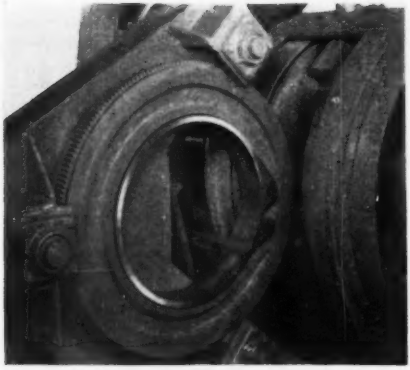
The heads are hydraulically operated, proper control valves being mounted at the front of the machine in convenient position for the operator.

The large circular workholder has gear teeth upon the o.d., and an opening of the correct size and shape to accommodate one brake band at a time while grinding the two parallel sides. The workholder is mounted between two sprockets at the front and a single sprocket at the rear which is driven, thus permitting rotating the brake bands.

In grinding, the operator places a part into the workholder and then starts the rotating action. He then actuates the hydraulic feed which carries the piece partially between the abrasive wheels where it will continue to rotate while the heads feed in hydraulically, removing stock from both sides of the brake bands simultaneously.

When grinding is completed, the heads are opened and the fixture withdraws





to the starting position for unloading.

Two 40 hp, 1800 rpm motors power the unit. Made by Gardner Machine Co., Dept. BB, Beloit, Wis.

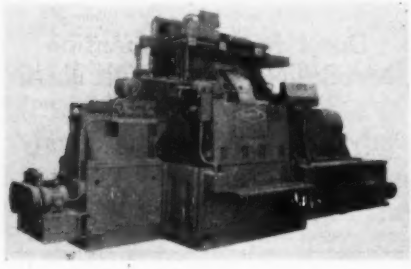
Use ACTION Card, opposite page 64. Encircle No. 26

Baker four-station machine performs multiple drilling operations

The new hydraulic feed Baker illustrated is an 85 HH single end machine with four station trunnion and auxiliary single spindle unit at left end station No. 4. The machine performs multiple operations on floating pistons for diesel engines, and will produce 41 parts per hour at 100% efficiency.

Mounted to a heavily constructed well ribbed steel end bed is a floor type unit having 30″ width of hardened steel ways in 60″ length of saddle with automatic lubrication for saddle, ways and gibs.

The machine has an available feeding pressure of 23,500 lbs. and is equipped with an Oilgear variable delivery pump base mounted with ample oil sump. Multiple head unit is arranged for direct drive from the main motor with provision for pick-off speed change gears. Spindles are of the quill type.



Mounted at the opposed end of the new Baker at station No. 4 is an auxiliary single spindle hydraulic feed unit with an independent hydraulic system for the finish centering operation of the dome end. A centrifugal type pump with ample coolant sump is provided. The main unit is equipped with two feeds, and both units are provided with positive stop delayed reverse and electrical cycle to the controls.

Hand indexing is achieved with a single control panel. Baker Bros. Inc., Dept. B, Toledo, Ohio.

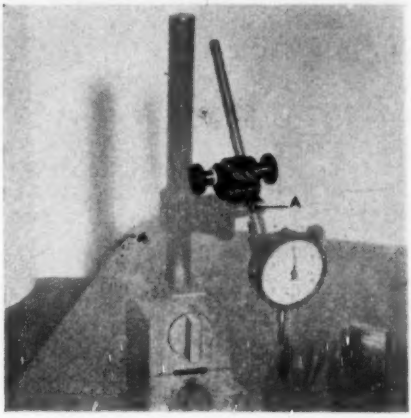
Use ACTION Card, opposite page 64. Encircle No. 27

Fine-adjustment sliding swivel gives smooth, precise indicator setting

Smooth, positive positioning of dial gages graduated in ten-thousandths is claimed with Rocheleau's newly developed fine-adjustment sliding swivel, without tapping or otherwise jarring the indicator rod.

This rigid, patented device has a separate clamp for each rod (5/16″ or ⅜″ sizes), by which approximate setting of the indicator is quickly completed. Final, precise positioning is then smoothly and accurately made by slight movement of the convenient lever "A". Only a simple die holding rod is required, as all adjusting is done with the device itself.

Applications cover a wide variety of inspection, toolmaking, and general ma-



chining operations. As a complete unit, it may be attached to any indicator base now on the market, or the fine-adjustment mechanism may be used on boring, milling, shaping, or planing machines or fixtures requiring a dial indicator. L. A. Rocheleau Tool & Die Co., Dept. BB, 651 North Main St., Leominster, Mass.

Use ACTION Card, opposite page 64. Encircle No. 92

Power press brake

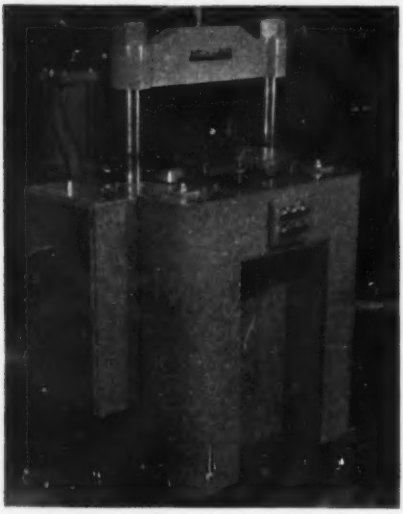
This stub type power press brake was developed primarily for V-forming, U-forming, general forming and other such requirements necessitating controlled pressure at the point of operation, having completely controlled recorded pressure throughout the work cycle.

The work cycle is divided into a low pressure advance to the work, and high pressure for the forming or shaping period of the work cycle. The timing of the cut-in, and the time period for each phase can be easily varied.

Fully automatic cycling, consisting of low pressure advance and high pressure forming, and controlled retreat is possible. If desired, the machine can be hand controlled through any of the above mentioned work cycles.

Length of stroke can be varied from 2" to 11", excluding die height.

The entire unit works off the shop air line, and has a capacity of 42 tons at 100 psi. It is adaptable to practically any type of power brake press dies in short lengths up to and including 24". Dayton Rogers Mfg. Co., Dept. B, Minneapolis, Minn.

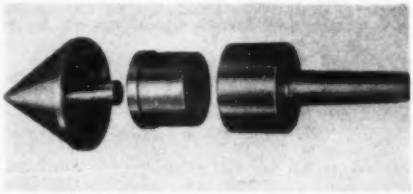


Use ACTION Card, opposite page 64. Encircle No. 93

Cold weld eliminated with live center

A live center designed to eliminate the cold weld problem has been announced by Nirol Mfg. Co., 82 U.S. Highway 22, North Plainfield, N.J. It has only five movable parts (exclusive of such parts as set screws, lock ring, etc.) and is claimed to reduce overhang to minimum, thus eliminating vibration and chatter and increasing machine capacity.

High radial and thrust loads are accommodated by the three sets of bearings within the tool. Two sets of needle bearings encompass the spindle maintaining rotation accuracy to within .0002". The third, a ball type end thrust bearing, increases the center's capacity to withstand heavy loads. The remaining movable part is a pressure spring which automatically compensates for work expansion and contraction due to heat. This feature avoids continual resetting of the tailstock and eliminates cold weld.



Centers are made in all standard sizes with either standard taper or straight shanks for use on lathes, milling machines and grinders. Special sizes or tapers can be made on order.

Use ACTION Card, opposite page 64. Encircle No. 94

Don't forget to mention MACHINE and TOOL BLUE BOOK when writing advertisers, or use the handy Readers' Service card opposite page 64.

Technical BOOKS

Metals and How to Weld Them

By T. B. Jefferson, Editor, The Welding Engineer, and Gorham Woods, metallurgist. 322 pages, over 170 drawings, photographs and tables; stiff board, cloth covered binding, gold embossed, price $2.00 in U.S.A., $2.50 elsewhere. Publisher, The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

A new book for the welding operator, supervisor, instructor, engineer, designer, and manager; explains in clear, logical, readily understood steps the structure and properties of metals and how to weld them. Covers the fundamentals of metallurgy and their significance for welding metals. Gives procedures for welding mild, medium and high carbon steel, alloys, cast iron, hardfacing, stainless and high chromium steels, austenitic manganese steels, tool and die steels; how to make good welds, trouble shooting, welding terms and useful data.

This is a combination text and reference book to give all users of welding a practical work knowledge and source of information for designing and making better welds at lower cost.

The first 6 chapters are devoted to elementary discussion of metals, their mechanical and physical properties and uses. The fundamentals of metallurgy and their significance in heat treating and welding are explained in logical steps. This information is then related to correct welding procedures for steels, cast iron, nonferrous materials and hardfacing. All commonly used types of metals are covered. The final section of the book is devoted to information for making good welds, trouble shooting, cost estimating, and explanation of welding terms.

Forming and Bending Kaiser Aluminum

Kaiser Aluminum & Chemical Corp., Dept. BB, 919 N. Michigan, Chicago, Ill.; 272 pages; price $2.00; free when requested on company letterhead.

Apparently the most comprehensive volume that has ever been published exclusively on the processes of forming and bending aluminum. Practical procedures and technical advancements are included as well as comparative data on the various types of equipment, characteristics of specific alloys and their suitability to particular operations and comparisons of methods and technique suggestions for specific problems.

Subjects considered in separate sections of the technical publication are: Forming with hydraulic and mechanical presses; bending with hydraulic and mechanical press brakes; forming aluminum in rubber; roll forming; spinning; bending pipe and tube with power and hand-operated machines; tensive and compressive forming; a glossary of words applying to metals and metalworking.

Technical FILMS

Blanking and Piercing

15. minutes.

The film describes the techniques employed in cutting blanks and piercing holes in aluminum sheet. It explains how to lay out sheet economically; how to design tools with proper clearance; the precautions required in setting up tools for best results and why thorough lubrication and careful maintenance are important. The use of shears, saws and routers is also discussed, as in the Guerin "rubber pads" method.

Special Machinery

Special Machinery Sales Dept., Greenlee Bros. & Co., Rockford, Ill.
18 min., 16mm B & W sound.

This demonstrates the application of special machinery to the production of two types of automotive transmission parts. The film follows the progress of the workpiece through the stations of five huge transfer machines, and deals especially with unusual fixtures that tilt, rotate, and tip the workpieces during the machining operations. Other details of transferring, clamping, and machining are clearly shown, and

the general introduction gives a brief history of the development of special transfer-type machinery since the Greenlee organization designed and constructed their first unit in 1935.

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., has announced the appointment of **Stanley W. Lovejoy** to the position of manager, cutting tool research. His duties will include basic research, development and testing of products manufactured in the company's cutting tool division.

Stanley W. Lovejoy

Marc Bendick

At the annual meeting of the board of directors of the Barnaby Mfg. Co., Inc., Bridgeport, Conn., **Marc Bendick** was elected as president, **Barnabus Toth** having retired as active head of the firm.

Also elected were **Jack Stock,** treasurer; **Louis F. Kutscher,** sales manager; **Harold Saunders,** superintendent.

The Rotor Tool Company of Cleveland, manufacturer of pneumatic and high cycle electric tools, has announced that Big Three Welding Equipment Co. will distribute its products in Texas, Oklahoma and New Mexico.

The Falcon Tool Co., Detroit, have announced the appointment of the Pearce Tool & Gage Co., Chicago, as their exclusive representative and stocking distributor for all of the northern half of Illinois and the eastern half of Iowa.

The following firms have been made distributors and factory representatives for the Mead Specialties Co., Chicago: J. B. Morrison Machinery Co., Ltd., Toronto, Canada; L. S. Tarshis & Sons, Ltd., Montreal.

Lloyd McDonald dies suddenly

Heart failure was the cause of the sudden death of **Lloyd D. McDonald,** executive vice-president of the Warner & Swasey Co., Cleveland, recently.

Mr. McDonald joined Warner & Swasey in 1918. Beginning in the credit department, he was successively advanced to the positions of credit manager, assistant treasurer, vice-president, and, in 1950, executive vice-president. He had been a director of the company since 1936.

Mr. McDonald was a past president and director of the National Machine Tool Builders' Assoc. He was recognized as one of the industry's leading authorities on the subject of depreciation.

The Lincoln Electric Co., Cleveland, Ohio, has elected **William Irrgang** president and general manager of the company. **James F. Lincoln,** elected chairman of the board, will remain active in the direction of company policies. **John C. Lincoln,** founder of the company, was

W. Irrgang

J. F. Lincoln

elected honorary chairman of the board and treasurer. Other officers elected were **John S. Roscoe,** executive vice-president; **A. F. Davis,** vice-president and secretary; **George Landis,** vice-president.

The following appointments to the sales staff of the Continental Screw Co. have been announced: **Raymond J. Dever,** New Jersey and parts of metropolitan New York City; **Leonard A. Ashworth,** the remainder of metropolitan New York, in addition to Connecticut, which he has served for the past seven years; **Henry J. Purrington,** Maine, New Hampshire, Vermont and the western part of Massachusetts and a portion of eastern New York state.

Operator's platform

Giddings & Lewis Machine Tool Co., Dept. B, 142 Doty St., Fond du Lac, Wis., has announced a new type operator's platform for use on the Series 50 Fuar tracer machine.

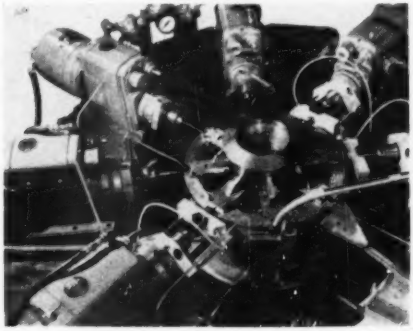
The elevator enables the operator to

return to floor level for tools and other equipment quickly and safely without climbing up and down the column ladder.

Use ACTION Card, opposite page 64. Encircle No. 31

Sliding sub-bases for drill units

The drill unit division of Rockwell Mfg. Co., 434-B N. Lexington Ave., Pittsburgh 8, Pa., has introduced a line of sliding sub-bases as an accessory for



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FASTER GRINDING!

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AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

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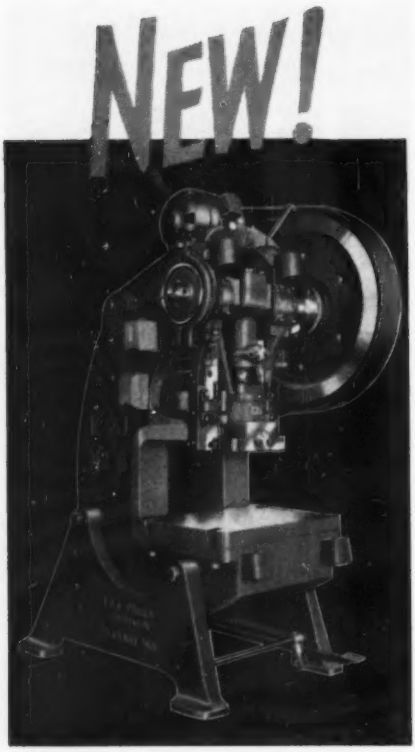
207 Waubesa St., Madison 10, Wis., U.S.A.



65-ton L&J Press

New No. 6 press featuring greater efficiency—lower production costs—heavy rigid frame—extra deep throat—replaceable bronze bushings in main and upper ram bearings—buttress threads on ram screw—hard bronze ball seat—roller bearings in flywheel or main gear and backshaft mountings—long, precision-scraped gibs—air clutch available. Also made in backgeared model. Other sizes 6 to 80 tons. *Write for literature.*

L&J PRESS CORPORATION
1625 STERLING AVENUE
ELKHART, INDIANA

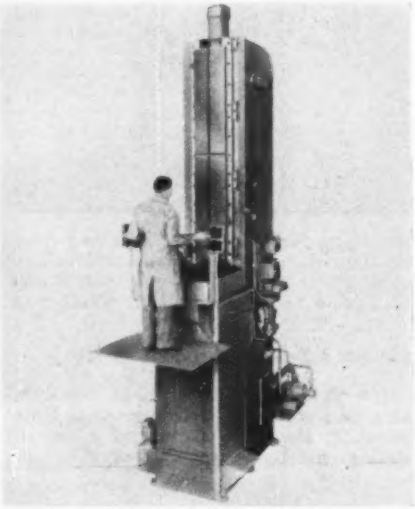
increasing the versatility of its standard air-hydraulic drill units by enabling them to be moved forward or back with relation to the parent machine without loss of machine alignment.

This feature facilitates removal and replacement of tools, thus reducing time expenditures for tool changes, repair, etc. It also saves time and effort in making setup adjustments where the machine is designed for work on a wide range of part sizes.

Use ACTION Card, opposite page 64. Encircle No. 32

Vertical hydraulic surface broaching machine

The American Broach and Machine Co., Dept. BB, 415 W. Huron St., Ann Arbor, Mich., has announced a vertical hydraulic

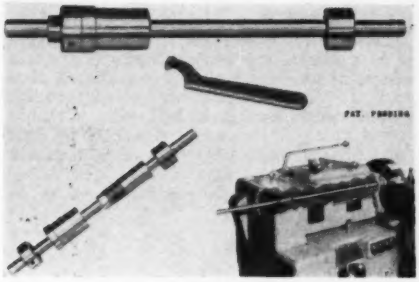


surface broaching machine (SB-90-15), with 90" stroke and 15 ton work capacity. It can be supplied as a single or dual ram unit.

Use ACTION Card, opposite page 64. Encircle No. 33

Spindle stop is installed in one minute

A spindle stop recently announced by Tage Anderson Machine Works, Dept. MTB, Rockford, Ill., has been designed so that it can be used on any attachment or fixture with a draw bar. Size of spindle



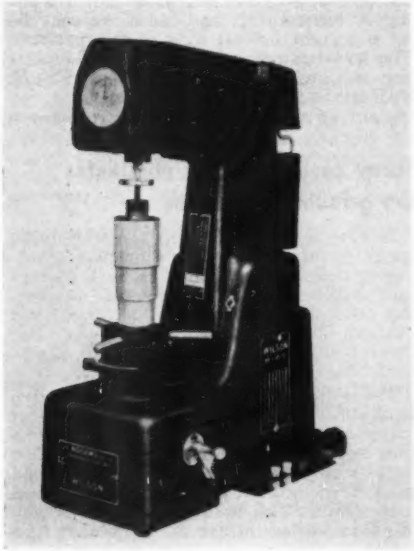
stop is determined by the diameter of the lathe spindle.

Consisting of only four parts (main body, body nut, body sleeve, guide bushing), the unit can be installed in less than one minute, the manufacturer claims.

Use ACTION Card, opposite page 64. Encircle No. 34

Rockwell motorized hardness tester

A Rockwell motorized hardness tester, Model Y, which is semi-automatic in operation, has been announced by the Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., Dept. BT, Bridgeport, Conn. According to the manufacturer, the device features a short test cycle to permit an increased number



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Whitehead makes washers and shims from any metal or special material to your specifications. Thickness from .002" to 3/8".

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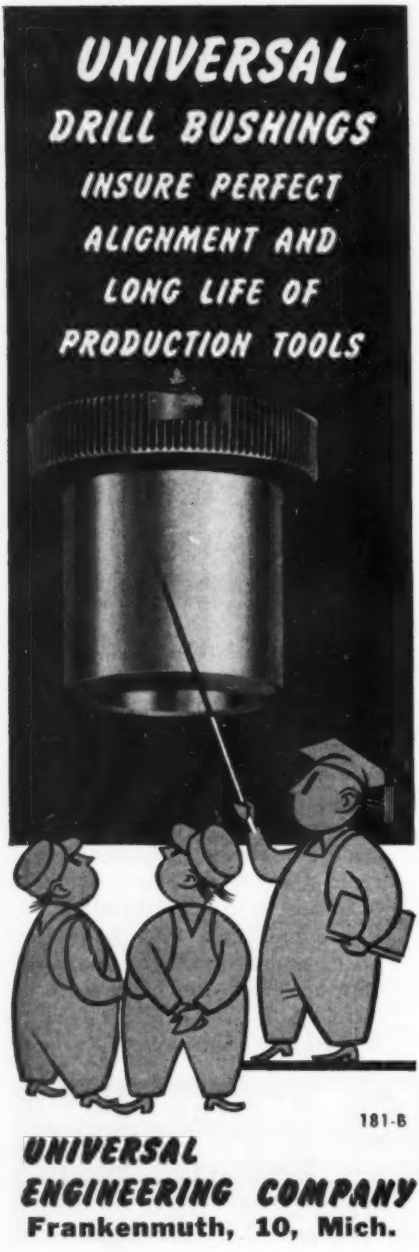


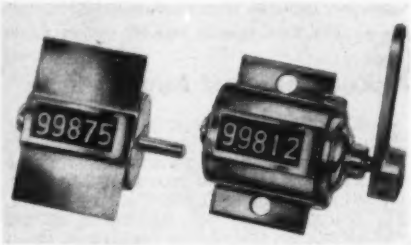
of Rockwell readings to be taken and recorded within a definite time period.

The motor's function in the test cycle is to remove the major load. The cycle of major load operation is less than 2 seconds. Its application is controlled through a dash pot, which gives infinitely variable speed control. Power is supplied to unit from a 110 volt, 60 cycle, single phase a-c line.

Use ACTION Card, opposite page 64. Encircle No. 35

Die cast counters

The Micro Meter series of small die cast counters are available in ratchet style, with either internal or external stops, ratchet rotary, direct drive and revolution, in three, four, and five figures capacity, with either base flange or window flange for panel mounting. Two directions of rotation are provided, top going or top coming, and the drive may be on the right or left side of the counter. The speed range is from 500 to 1000 counts per minute. Durant Mfg. Co., 1928 N. Buffum St., Milwaukee 1, Wis.

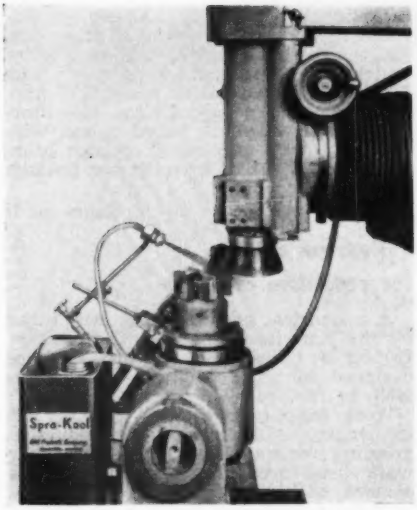


Use ACTION Card, opposite page 64. Encircle No. 36

Spray coolant system eliminates dry grinding operations

A new Spra-Kool system for applying spray coolant to any type of dry grinding or polishing operation, as well as certain drilling, milling, chamfering, or boring operations that do not require flood coolant, has been announced by Bar Products Co., 3703-B Highcrest Rd., Rockford, Ill.

The system is designed with a valve and spray nozzle which provide a jet spray of coolant to tools and work. The fine spray prevents dust and dissipates heat from work. A rust inhibitor mixed with the coolant prevents tarnish and rust stains. The amount of coolant applied is varied either by adjusting the



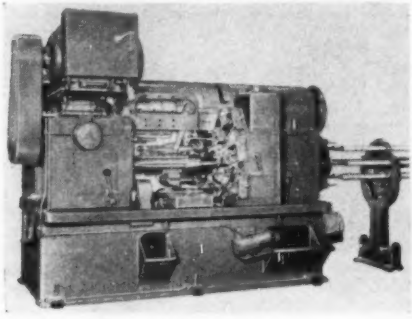
air pressure or raising or lowering the siphon level of the coolant.

Use ACTION Card, opposite page 64. Encircle No. 37

Six spindle bar machine

Cone Automatic Machine Co., Inc., Dept. B, Windsor, Vt., has announced its 1⅝" Model TF six spindle Conomatic bar machine.

Some features are: stronger machine frame, with more powerful motor drive; larger diameter transmission shafts and bearings; large diameter work spindle carrier, with wider spindle spacing for cooler spindle bearings; larger diameter main end slide, with 3¼" work center clearance for ample swing of tool heads



You can now use your broken tang drills, reamers, end mills and other taper shank tools!

Made of the finest spring steel, the newly developed PILOT sleeve grips the tool firmly along the full length of the taper with far greater surface contact than any ordinary sleeve. Tool and sleeve become almost a solid assembly, yet can be disengaged with a simple twist of the wrist! Never any jamming or scoring to mar the shank.

The PILOT's patented flexible construction assures concentricity. Regrinding of tools is made easy because it adapts itself to any surface irregularity inside the machine spindle and around the tool.

Cut costs... Order the PILOT in the types and sizes you need, **now!**

TYPE A: For drills, etc. with or without broken tang.

TYPE B: For drills, etc. with broken tang **only.** Ideal for heavy duty drilling.

Size No.	1	2	3	4	5
Morse Taper	1:2	2:3	3:4	4:5	5:6
Price—FOB New York	$4.00	$6.00	$8.00	$16.00	$25.00

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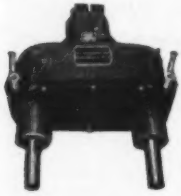
makes ALL TYPES of DRILLHEADS

Universal Joint Drillhead. . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From ½" Minimum Centers up. Capacities to 1" in Steel.



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of special work design, and for the accommodation of larger and stronger tool and attachment standard holders; heavier and stronger main end slide drive arm; 2.5 sec. minimum work cycle; a 5 min. maximum work cycle; 1.7 sec. idle time; fast and slow spindle speed range, with available pairs of pick-off change gears to provide 31 speeds from 128 rpm through 2502 rpm.

Use ACTION Card, opposite page 64. Encircle No. 38

Cylindrical grinder for repetitive grinding

A cylindrical grinder being introduced by the American Herforder Corp., Dept. B, 1546 N. Orleans St., Chicago, Ill., was designed for fast repetitive grinding as well as for toolroom work.

Work capacity is up to 4" dia. by 12" in length, with maximum production grinding recommended at 1½" dia. The work head accommodates No. 1 Morse centers, both live and dead, as well as 4" three-jaw tapered draw-in chuck, and quick change collets up to ⅝" capacity.

The machine is equipped for both plunge and traverse feed grinding, with automatic infeed at the stops. Work head speeds are variable from 125 to 610 rpm. The wheel spindle carries a 12x1x3" wheel powered by a 1¼ h.p., 3 phase 60 cycle motor. Work head and coolant pump are wired into main controls so that both stop automatically for work change at final size.

Use ACTION Card, opposite page 64. Encircle No. 39

AVAILABLE LITERATURE

FREE CATALOGS AND BULLETINS AVAILABLE FROM MANUFACTURERS

For copies of the literature in which you have an interest use the postage-paid postcard on the next page. Merely circle the identifying numbers and mail the postcard.

1. **"Investment Castings** — Basic Design Factors for the Engineer," a 20-page booklet from Scott Casting & Mfg. Co., Dept. BB, 116 W. Lancaster Ave., Berwyn, Pa., gives simple, easily understood explanation of the lost wax process, its limitations, sizes and weights of parts supplied, tolerances, holes, slots and surfaces, castable metals and alloys, also what to avoid in designs.

2. **Turret Lathe Tool Catalog.** The seventh edition has been released by Warner & Swasey Co., Dept. MBB, 5701 Carnegie Ave., Cleveland, Ohio. Designed to explain how each tool works and the job for which it can be used, the 197-page book also contains listings of company's standard tools, chucks, collets and miscellaneous equipment.

3. **Automatic Multi-Spindle Machines,** for drilling, tapping, milling, screw inserting and assembly of small parts, and case histories are contained in a brochure from The Bodine Corp., Dept. B, Mountain Grove Ave., Bridgeport 5, Conn. Brochure describes 12 actual case histories of how Bodine automatic equipment is utilized by various manufacturers.

4. **Gearless Drill Heads.** Eight pages of technical data sheets available from Zagar Tool Inc., Dept. MB, 24000 Lakeland Blvd., Cleveland 23, Ohio, provide information on Zagar gearless drill heads which now can have drill and tap spindles as close as the sum of the drill diameters. Example: a ½" drill and a ¼" drill can now be placed on ¾" center.

5. **Thread Rolling Machine** which uses planetary dies to thread up to 2,000 blanks per minute is covered in new 4-page bulletin No. 942-A from Waterbury Farrel Foundry & Machine Co., Dept. BB, Waterbury, Conn. Bulletin describes and illustrates the new machine in detail, close-up views show circular die arrangement which can thread all standard types of machine screws, round, button, truss, binder, fillister, flat and similar heads.

6. **Multistage Centrifugal Blowers & Exhausters** are described in new 12-page bulletin from Air Appliance Div., U. S. Hoffman Machinery Corp., Dept. BBB, 105 Fourth Ave., New York, N.Y. Bulletin, M-103, contains data on design, types and advantages, applications, and also contains charts showing capacity ranges of blowers and exhausters.

7. **Multiple Wheel Grinders.** New catalog describes Landis 10" and 14" type H-IW Multiple Wheel Grinders for grinding diameters simultaneously. Shows 12 different tooling set-ups for various shafts, includes descriptions of machine and specifications.

8. **Report on Interchangeability** of dies & fixtures between hydraulic and mechanical presses is available from National Tool Builders' Association, Dept. B, 2071 E.

102nd St., Cleveland 6, Ohio. The Engineering Standards Committee of Hydraulic Press Section of the Association recently completed the glossary of engineering terms for hydraulic presses. Copies available at 75 cents.

9. Milling & Drilling Machines. Eight-page catalog from The Ohio Machine Tool Co., Dept. MB, Kenton, Ohio, covers specifications and illustrations of line of quick-change and production drills, cam and hydraulic feed units, table and floor type horizontal boring, milling and drilling machines, and revolving tables and shapers.

10. Refinishing of Stainless Steel manual available from R. G. Haskins Co., 2647 W. Harrison St., Chicago 12, Ill. Manual covers methods of refinishing stainless steel, mill finishes, sheet finishes, grinding, polishing, buffing, and tips for better finishing. Also includes specifications and illustrations of Haskins flexible shaft machines and accessories.

11. Magnetic and Fabric Filter. Sixteen-page bulletin illustrates and describes Kleenall combination magnetic and fabric filter, utilizing the practicability and low maintenance requirements of separation by permanent magnetic field and cleaning by filtration through preselected fabric medium. Laboratory facilities, application, engineering, and testing services are available to help solve coolant cleaning problems large and small. Available from Barnes Drill Co., Filtration Div., Dept. BB, 852 Chestnut St., Rockford, Ill.

12. Decimal Equivalent Chart. New, 3-color, plastic coated desk size decimal equivalent chart from John Hassall, Inc., Box 2214, Long Island, New York. Catalog also contains information about cold forged nails, rivets, screws and fasteners.

13. Keyseating Machine. Catalog from Northfield Foundry & Machine Co., Dept. MB, Northfield, Minn., covers new keyseating machine which is designed to cut straight or tapered internal keyways from ⅛" to 1" in width.

14. Delpark Filters for Landis Grinders. New folder available from Industrial Filtration Co., Dept. B, Lebanon, Ind., contains information on Delpark Filters for use with Landis precision grinders. Also contains technical data on numerous Landis machines and the Delpark Filter size required for the coolant flow. Illustrated is one of the newest Landis Grinders, No. 12 Centerless Grinding Machine.

15. Circulating & Coolant Pump Bulletin, form 7074-D, shows the entire line of Ingersoll Rand Co., Dept. MTB, 11 Broadway, New York 4, N.Y., Class KRV & KRVS motor pumps as set up with totally enclosed motors, and should be of particular interest to manufacturers of washing, cleaning, dairy, bakery, water conditioning machinery and machine tools.

16. Condensers & Coolers. Bulletin No. 123 from Niagara Blower Co., Dept. BB, covers Niagara Blower Aeropass design and its large liquid cooling and condensing applications.

17. Problems in Metal Quenching are discussed in detail in a new booklet from Gulf Oil Corp., Dept. BB, 1822 Gulf Bldg., Pittsburgh 30, Pa. The 24-page booklet is illustrated with charts and graphs depicting cooling curves, cooling rates, effect of bath temperatures, agitation curves, hardness penetration curves and transformation diagrams. Case studies are also covered.

18. Sandblast Machines. A new bulletin issued by Leiman Bros., Inc., 173 Christie St., Newark 5, N.J., gives detail of their improved line of standard cabinet type sandblast machines featuring an oversize viewing glass which allows full vision. Bulletin, No. 6224, also gives information on company's automatic and other types of sandblast machines.

19. Super Alloys. Universal-Cyclops Steel Corp., Dept. MTB, Bridgeville, Pa., has released a brochure on super alloys—high strength heat and corrosion resistant materials. These materials are used for the critical parts of jet engines and other forms of gas turbines, turbo-superchargers, rockets and guided missiles. These alloys are also coming in for use in steam turbines, oil refineries and other equipment. Included are notes on uses and characteristics of some of the company's super alloy grades, tables and charts illustrating the properties of these materials and forms in which they are available.

20. Tool Holder. A new bulletin covering line of "Toolflex" floating tool holders is available from Burg Tool Mfg. Co., 3743 Durango, Dept. BB-10, Los Angeles 34, Calif. Complete specifications for all sizes and models are included.

21. Faster Machining Leaded Alloy Steels. New bulletin, No. 14-5, describes Rycut 40, which Joseph T. Ryerson & Son, Inc., Dept. BB, P.O. Box 8000-A, Chicago 80, Ill., claims to be the world's fastest machining alloy steel in its carbon range. (.40 carbon). Included are case studies showing machining comparisons, increased production, and typical savings in cost of machined parts.

22. Hydraulic Cylinders. Bulletin HC-1 from American Hollow Boring Co., Dept. MB, Erie, Pa., briefly describes and illustrates the boring and honing of cylinders and shafts to exacting specifications.

23. Accessories for Lubrication. Sixteen-page catalog of installation accessories for lubrication, hydraulic steam, liquid and air applications has been released by J. N. Fauver Co., Inc., Dept. B, 51 West Hancock, Detroit 1, Mich. It contains specifications, and prices on adaptors, couplings, nipples, hose anchors fittings, hose clamps, brass pipe fittings, snubber tools and hose stems.

24. Optical Form Grinder Projector-Comparator. Bulletin from Portman Instrument Co., Dept. MTBM, New Rochelle, N.Y., describes new Portman Model OFG-200 Optical Form Grinder Projector-Comparator. This dual purpose instrument has been designed so that it may be used on most standard precision surface grinders of either 6 x 18", or 8 x 24" size. Bulletin includes specifications, illustrations and diagrams.

25. Air Blast Valve. Bulletin from E. J. Littell Machine Co., 4147 Ravenswood Ave., Chicago 13, Ill., describes a new delayed action air blast valve. These valves are built to blow after cam has passed over the valve roller. This delayed action valve is required on compound blanking dies and similar jobs where stamping is freed at top of the press stroke.

26. Machine Tools. Eight-page catalog from the Ohio Machine Tool Co., Dept. BB, Kenton, Ohio, covers specifications and illustrations of quick change drills, production drills, drilling machine feed units, horizontal boring, milling and drilling machines—table and floor types, revolving tables, shapers and milling machine.

27. Expanding Mandrel. New brochure describes The E. Westberg Corp., Dept. BB, Colletmandrel — a reversed collet, which grips the work piece from the inside surface. It consists of one piece which grips and releases the inside of the work with the same maneuver as a collet grips and releases the outside.

28. Paint Spray Booths. Bulletin No. 66 from Despatch Oven Co., Dept. MTB, 4554 N. Broadway Ave., Chicago, Ill., covers new "Cleanaire" water wash paint spray booth. Company claims a new principle of design in paint spray booths for the removal of pigment and moisture from the exhaust air has been incorporated in the booth. Bulletin includes illustrations, applications and diagrams.

29. Machine Tool Clamping. Folder from Montgomery Tools, 24A Austin St., Newark 5, N.J., describes machine tool clamping made for use on all milling, boring and gear cutting jobs in tool room, maintenance shop and production department. Clamps have 4 height ranges, 1/16" milled serrations, plus a 2" radius on the base of the uprights to allow 1/32" height adjustments.

30. Jig Borer. Bulletin from W. B. Knight Machinery Co., 3924 Pine St., St. Louis 8, Mo., covers company's Model No. 50 jig borer. Company claims this machine makes work transfers unnecessary and reduces set-up time by half.

31. Mechanical Data Book for Valves & Pumps available from The Fulflo Specialties Co. Inc., Dept. MBT, Blanchester, Ohio. Covers line of by-pass, oil-relief and piston type hydraulic valves. Specify data book for valves or pumps or both.

32. Tapping Heads. Illustrated brochure from Procunier Safety Chuck Co., Dept. BB, 14 S. Clinton St., Chicago, Ill., gives complete details, specifications and prices on the line of Procunier high speed tapping heads.

33. Water-Mix Cutting & Grinding Fluids Guide is available from D. A. Stuart Oil Co., 2749 S. Troy St., Chicago 23, Ill. The guide is intended as a help in selecting a water-mix. It also provides information and background on water-mixes generally.

34. Air and Hydraulic Power Story. Five books, totalling 68 pages, containing data on how to lay out air and hydraulic circuits are available from Rivett Lathe & Grinder Inc., Dept. MTBD, 18 Riverview Rd., Brighton 35, Boston, Mass. Specify

THIS HELPFUL LITERATURE NOW AVAILABLE

books wanted: Hydraulic Cylinder Catalog 106; Hydraulic Valve Catalog 204; Hydraulic Power Unit Catalog 400; Air Cylinder Catalog 55; and Air Valve Catalog 303.

35. Keyway Broach Kit. Catalog from du Mont Corp., Dept. T, Greenfield, Mass., describes 25 standard kits, 23 standard sizes of broaches, 71 standard size bushings and a wide variety of production type guideless broaches and square broaches.

36. Facts About Hardness Testing. Clark Instrument Inc., 10200 Ford Rd., Dearborn, Mich., offers book containing numerous illustrations and procedure for fast, accurate hardness testing of non-ferrous materials.

37. Dy-Namic Balancing Manual containing 20 pages of tables, diagrams, application photographs and latest technological developments, gives examples where "Dy-Namic Balancing" can cut costs, mechanical failures and maintenance expense, is available from Bear Mfg. Co., Dept. M-B, M-20, Rock Island, Ill.

38. Universal Iron Bender. Bulletin from Hossfeld Mfg. Co., Dept. BB, Winona, Minn., describes and illustrates wrenchless type universal iron benders, and hydraulic attachments.

39. Automatic Variable Speed Pulleys. Diagrams, illustrations and tables covering Hi-Lo pulleys are covered in an 8-page brochure available from Equipment Engineering Co., 2853 Columbus Ave., Minneapolis, Minn. Specifications and information on how to select a pulley system are included.

40. "Safety Hints in Grinding" is a new pocket-size booklet from Besly-Welles Corp., Dept. BB, 20 N. Wacker Drive, Chicago 6, Ill. The "wrong" and "right" ways to test, mount and use grinding wheels and discs with the greatest safety are presented in a humorous cartoon style.

41. Tachometers. Herman H. Sticht Co., Inc., Dept. MTBD, 27 Park Place, New York, N.Y., has issued bulletin No. 1046 which shows in condensed form five of the company's tachometers, hand tachometers, centrifugal type; hand tachometers, chronometric type; hand tachoscopes; stationary tachometers, centrifugal type, cable driven; vibrating reed tachometers, both portable and stationary types.

42. Motor Arbors. Three bulletins from S. A. Woods Machine Co., Motor Division, Dept. MTB, Boston 27, Mass., describe and illustrate company's precision motor arbors. Motor arbors are available in a wide variety of types, of unusually small diameter of frames and if desired flatted opposite the motor feet or at either side. Ball bearings are so mounted as to eliminate end play and arbor extensions will be supplied of abnormally large diameter and of special heat-treated material when so required.

43. Alloys in Foundry and Pattern Shop. A useful booklet incorporating several new ideas has been issued by Cerro de Pasco Corp., Dept. A-40 Wall St., New York, N.Y. Booklet describes how Cerro de Pasco low-temperature melting alloys are used in the making of master patterns for constructing aluminum matchplates, for anchoring patterns in matchplates, for altering and repairing matchplates and for other useful tasks.

44. Broaching Fixtures. A new 12-page catalog (B54-9) describing Red Ring self-contained, air-powered bench-type broaching fixtures is available from National Broach and Machine Co., Dept. BB, 5600 St. Jean Ave., Detroit 13, Mich. Catalog describes and illustrates in detail with photographs and line drawings, several different typical applications of compact, cost-saving fixtures.

45. Threaded Fasteners. Standard Pressed Steel Co., Box 606, Jenkintown, Pa., has issued a 32-page catalog describing in detail and in pictures the company's line of Unbrako precision threaded fasteners. Catalog includes socket screw products, socket head cap screws, self-locking set screws, shoulder screws, flat head socket cap screws and button head socket screws.

46. Cutting Machine. A 4-page brochure covering dimensions, specifications, diagrams and illustration of the Metal Worker Cutting Machine has been released by Tech-Pacific, Newport Beach, Calif. Company states machine was developed to cut practically any material within its capacity such as mild steel, stainless steel, aluminum, brass, copper, fibre, etc.

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47. Precision Tumbling. Three folders from Miller Machine Tool & Gauge Shop, Dept. MTB, 3613 San Fernando Rd., Glendale 4, Calif., are titled: Reduce Production Costs 80%; Media and Compounds; Outstanding Features of the Most Modern Barrel Finishing Equipment. Folders also cover specifications and illustrations of company's Speed-D-Burr tumbling barrels and equipment.

48. Keyseating Machine. Catalog pages describe new keyseating machine manufactured by Northfield Foundry & Machine Co., Dept. B, Northfield, Minn. Catalog includes illustrations and specifications of machine which is designed to cut straight or tapered internal key ways from ⅛" to 1" wide.

49. Milling Machine. An 8-page brochure describing a new special-purpose automatic production milling machine has just been released by The Producto Machine Co., Dept. B, Bridgeport, Conn. Brochure presents a detailed description of this versatile production-type miller known as the Producto Mill-Matic. It is hydraulically operated with push-button electrical controls.

50. Cut-off Tool. One page folder covers "No Hogging" Cut-Off-Tool manufactured by the Northrup Tool Co., Dept. MTB, Kalamazoo, Mich. Illustration and specifications included in folder which describes this tool as consisting of a high-speed steel blade, a spring loaded blade holder, and a steel shank.

51. Precision Die Set. More than 300 sizes of ball bearing precision and super precision die sets are listed in the new seventh edition catalog of anti-friction die sets, guide post assemblies and accessories from Lempco Products Inc., Dept. BB, Bedford, Ohio. The 196-page catalog covers die set dimensions by means of prints giving A, B, C, dimensions cross referenced in accompanying charts.

52. Equalizing and Locking Sling. Four page brochure from The Caldwell Co. Inc., Dept. MBB, 3411 Auburn St., Rockford, Ill., contains diagrams, pictures and safety factor table covering Adjust-A-Leg equalizing and locking sling. Nine pictures of applications are also shown.

53. Auto Truer. Brochure from Sandford Manufacturing Corp., 1026A Commerce Ave., Union, N.J., provides illustrations and specifications, and diagram describing how auto truer works. Company states it gives true concentricity as low as .0001" in just a few seconds on chuck or face plate work, and it holds universal or independent chuck, face plate or special fixture.

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54. Two-point Presses. A new catalog, describing the new line of Steelweld two-point presses, is available from Cleveland Crane & Engineering Co., 5240 E. 281st. St., Wickliffe, Ohio. Presses are of the straight-side, tie-rod type. Sizes listed range from 160 to 500 tons capacity. Areas of bolsters listed go from 48 x 42 inches to 132 x 60 inches.

55. Automatic Machines. Bulletin 43 covers the complete line of Weld-A-Matic Splicers made by E. W. Bliss Co., Dept. BB, Rolling Mill Division, Salem, Ohio. These high-speed, automatic machines are available in 13 standard sizes and will weld ferrous or non-ferrous strip ranging from 8 to 94 inches in width. Bulletin also describes typical ferrous and non-ferrous mill installations.

56. Modern Skin Mill. How an old, heavy duty planer was converted to a modern skin mill for producing integrally-stiffened "skins" for jet planes is the featured article in the new "Simmons Way" published by the Simmons Machine Tool Corp., Dept. B, 1701 Broadway, Albany, N.Y.

57. Vertical Milling Machine. Four page folder describes features of Crwingshield Model VM-1 Vertical Milling Machine made by Crowingshield-Harris Co., Dept. BB, Greenfield, Mass. Folder includes general specifications for the machine and specifications of milling attachments.

58. Comparative Net Price Selector For Reamers has just been published by Lavalee & Ide, Inc., Dept. BB, Chicopee, Mass. The selector features an arrangement of their line of reamers by decimal equivalents from .004 to 3.0000 inches. All reamers are illustrated, described by type, shank, flute, length and L & I list number and priced.

59. Bench Vise & Press. Folder available from Railcens, Dept. BB, 120 N. Wisner St., Jackson, Mich., covers new hydraulic bench vise and press. Vise has interchangeable jaw plates with divided front head for punching, broaching, and removing gears, pulleys, etc., from long shafts. Specifications and illustration included in folder.

60. Gear Set Selection & Ordering Information, worm dimensions, gear and spider standards, tool charts and horsepower ratings of standardized Cone-Drive gear sets are contained in a 16-page Bulletin (700) available from Cone Drive Gears Division, Michigan Tool Co., Dept. BB, 7171 E. McNichols Rd., Detroit 12, Mich. In addition to the standard center distances and reduction ratios available from stock, additional sizes available but not carried in stock are detailed in two pages of tables.

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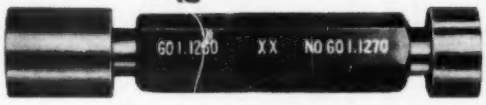

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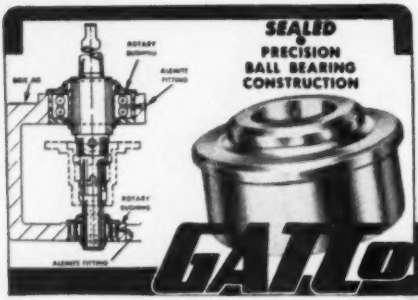

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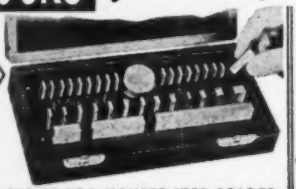

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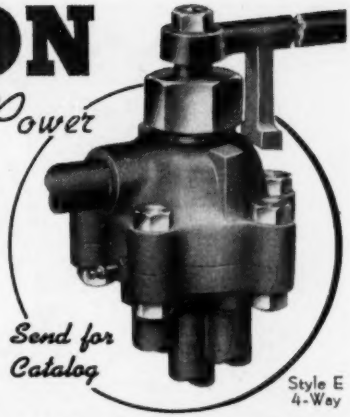

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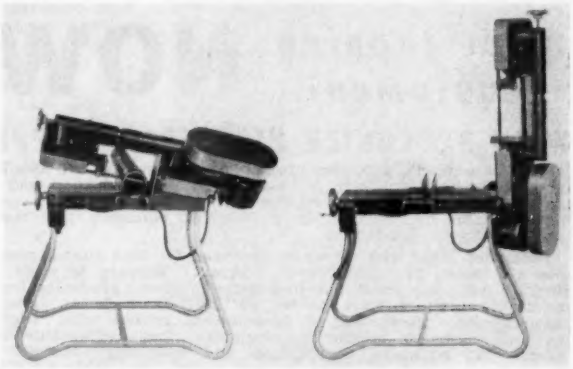
Two-way band saw needs no tools for change-over

A dual purpose metal cutting band saw, the 49A, can be used either as a horizontal or an upright band saw. No tools are required to change from one to the other. As a horizontal cut-off saw, it has a capacity of 3½" x 8" and 3½" dia.

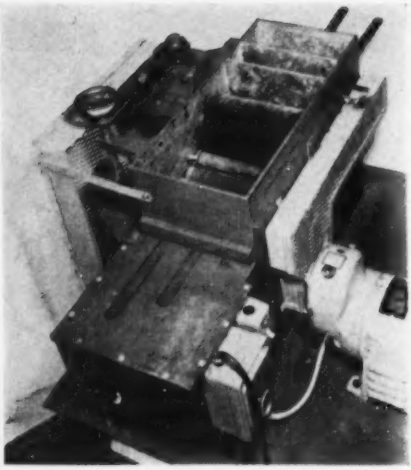


The blade is driven by a ¼ hp, 115 volt motor, controlled by a manual switch, with automatic shut-off at the end of each cut. It has a V-belt drive with selective speeds of 54, 100 and 190 fpm, and is equipped with positive screw type vise. Bed area, 6½" x 24"; height to top of bed, 24"; floor space, 16½" x 38". Wells Mfg. Corp., 707 Coolidge Ave., Three Rivers, Mich.

Use ACTION Card, opposite page 64. Encircle No. 40

Hack saw blade scrubber

A machine that removes loose scale and sludge from heat treated hack saw blades, or similar types of stock, before they are painted has been built by the Fuller Brush Co. Machine Div., Dept. MTB,



Hartford 27, Conn.

The operator loads the machine and the scrubbed, steam cleaned blades emerge into a basket or onto a conveyor. The machine can be adapted to scrub strip stock material on one side or both. The rate of feed is 41 lineal feet a minute.

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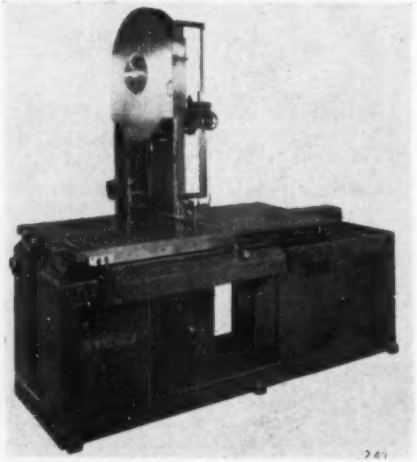
Band saw with hydraulic table

For metal cutting in sizes too cumbersome to be readily fed by hand, the Tan-



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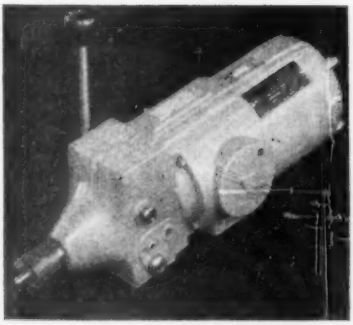


Illustrated above is a Model 1M Fen Automatic Wrench, which has a maximum torque of 250" lbs. at a spindle speed of 60 rpm.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

The Fen Automatic Wrenches are being used for driving pipe plugs on bench assemblies, operating fixtures on transfer machines and indexing machines.

The Fen Wrench will Banish "Wrench Wrestling" and increase production.

The Fen Wrench can be operated manually by push button or made completely automatic.

Why not send your wrench problems to us?

THE FEN
MACHINE COMPANY
28915 LAKELAND BLVD.
WICKLIFFE, OHIO

newitz Works is producing variable speed band saws equipped with hydraulically actuated tables.

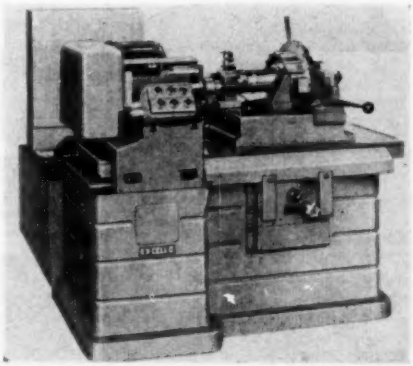
The machine shown is a standard size 36" band saw with a 36" x 37" table having a 0" - 6" per second hydraulic feed. Rapid traverse of table to point of contact between work and saw is provided to promote maximum production. The Tannewitz Works, Dept. BB, Grand Rapids, Mich.

Use ACTION Card, opposite page 64. Encircle No. 42

Gun-type drills used on boring machines

The Style 112-C precision boring machines with gun-type drills are claimed to be rigid, have smooth feeds and vibration-free spindles capable of rotating either the drill or the part at high speeds, and to be adaptable for multiple spindle arrangements.

Two or more spindles can be mounted on one bridge to drill two or more parallel holes in one part, or to drill holes in two or more parts. If center distances of the holes are too close to permit this type of setup, an indexing fixture can be used, or the work can be done on a

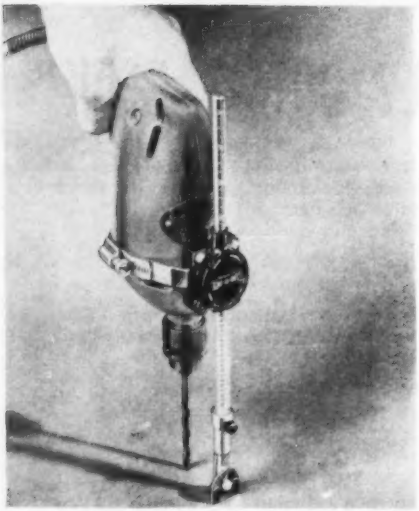


double-end machine, the holes being machined from both ends. Ex-Cell-O Corp., 1212 Oakman Blvd., Detroit 32, Mich.

Use ACTION Card, opposite page 64. Encircle No. 43

Attachment for drilling true holes

When attached to a portable electric or pneumatic drill, the Guid-O-Dril is claimed to enable inexperienced workers



to drill or ream true holes vertically, horizontally, or at an angle.

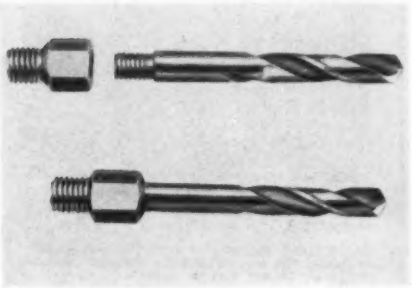
The forward end of the attachment consists of a quadrant marked in 15° graduations for vertical or angular alignment, plus an additional indicator scale for alignment in the horizontal plane. There also is a built-in depth gage. High Standard Mfg. Corp., Dept. B, Hamden, Conn.

Use ACTION Card, opposite page 64. Encircle No. 44

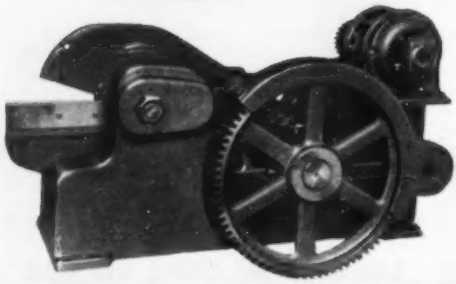
Drill-plus-adapter assembly

New drill for use with flexible drive shafts or extension arms drills holes in narrow and inaccessible places, such as airframe fuselages, wing and tail surfaces, other complex sheet metal shapes.

Old method was to use an adapter with



BELOIT
ALLIGATOR SHEARS



Solid cast steel Frame. Will not break, although overloaded. Ideal for shearing re-inforcing bars, spring steel and other hard material. Shear blades reversible with four cutting edges. These moderately priced machines will give many years of trouble free service under the most trying conditions.

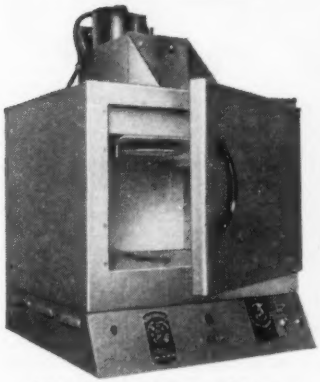
Specifications

Machine No.	G-1	G-2	G-3
Shear Blade length	6½ & 10"	7 & 12"	7 & 12"
Flat Bars	⅝ x 6"	¾ x 6"	1 x 6"
Reinforcing Bars	1"	1¼"	1½"
Round Bars	1¼"	1½"	2"
Shipping Weight	2500	3000	4800

Write for complete details

HENDLEY & WHITTEMORE 100 Blackhawk Blvd. Beloit, Wisconsin

Automatic
All-purpose
Precision Heating



Write for literature covering our complete line or recommendations to meet unusual requirements.

HUPPERT
MODEL 5700 SR
Semi-Recirculating
OVEN

Particularly suited for laboratory precipitation, ashing, general heating processes and for production tempering of tools and small parts. Temperatures up to 550° F. Thermostat accuracy 1% of scale range. Thoroughly insulated. Other features include: Adjustable vents, special insulation, explosion-proof latches, diffuser plate and sirocco fan, heavy duty motor and two (2) heavy expanded, baked aluminum finished shelves. I.D. 20" wide x 12" high x 19" deep. 110 volt AC or 220 single phase.

MODEL	WATTS	TEMPERATURE RANGE	PRICE
5700 SRL	1650	350°F. (180°C.) Maximum	$280.00
5700 SRM	1870	400°F. (204°C.) Maximum	$280.00
5700 SRH	2250	550°F. (288°C.) Maximum	$280.00

Other sizes and temperature ranges can be built to specifications. Also available with stainless steel Inner Housing, or all stainless steel construction - extra

1 Hour Timer $10.00 extra 20 Hour Timer $17.50 extra

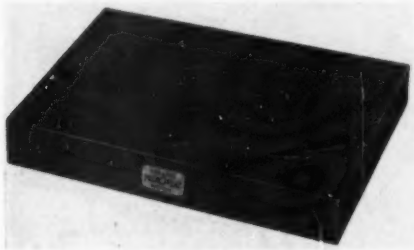
K. H. HUPPERT CO.
6845 Cottage Grove Ave., Chicago 37, Ill.
Manufacturers of Electric Furnaces and Ovens

a threaded shank drill; here, the two are combined in one unit. This is claimed to eliminate runout of the drill, difficult removal of broken drill-ends, and labor in assembling. National Twist Drill & Tool Co., Dept. B, Rochester, Mich.

Use ACTION Card, opposite page 64. Encircle No. 45

Granite layout plates lapped to stop seizure of objects

In a new line of black granite layout plates, special lapping techniques are employed to produce the layout finish which is claimed to eliminate seizure of gage blocks and checking fixtures that has occasionally occurred when using granite plates. A continuous bearing surface is interspersed with micronic valleys which afford sufficient air pocket relief between bearing surfaces to prevent seizure of instruments. The sub-divisions of the grain pattern are so small as to be invisible to the naked eye. Under profilometer check, layout plates are now lapped to a finish of 3 to 16 rms.



They differ from the surface plates in that they do not have clamping edges, but are straight-sided and finished to an accuracy of 0.0002" per foot. Manufacturer, Collins Microflat Co., Dept. BB, 2326 E. 8th St., Los Angeles 21, Calif.

Use ACTION Card, opposite page 64. Encircle No. 46

Tap-drill attachment is combination unit

The Errington tap-drill attachment is a combination unit to drill, countersink, ream, counterbore and tap, all on the one drill press spindle. The work is simply slid under the head from one spindle to another. An automatic reversing tapping spindle makes it unnecessary

1500° F. IN 5 MINUTES

Quick-Acting
JOHNSON
No. 120 Hi-Speed
FURNACE
$155.50
F.O.B. Factory

2300° F. IN 30 MINUTES

Turn the heat on production. Heat treat carbon and high speed steels, dies and tools in your own plant with JOHNSON No. 120 Hi-Speed. Fast heat-up saves time and gas. Temperatures easily regulated with accuracy. Firebox: 5 x 7¾ x 13½. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

Also available in bench style.
Write for Free Catalog.

Johnson Gas Appliance Co.,
570 E Avenue N.W., Cedar Rapids, Iowa

JOHNSON
FURNACES FOR INDUSTRY

to replace the drill press for tapping.

Capacity to ¼" drill and 5/16" tap; is available with 2, 3, or 4 spindles. Spindles spaced to handle work up to 5½" outside diameter. Errington Mechanical Laboratory, Inc., Dept. BB, 24 Norwood Ave., Staten Island 4, N.Y.

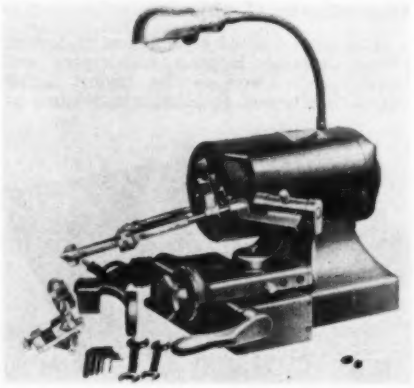
Use ACTION Card, opposite page 64. Encircle No. 47

Dry type drill grinder

The Brown-Brockmeyer Co., Dept. B, Dayton, Ohio, has added a new dry type drill grinder in both bench and pedestal models.

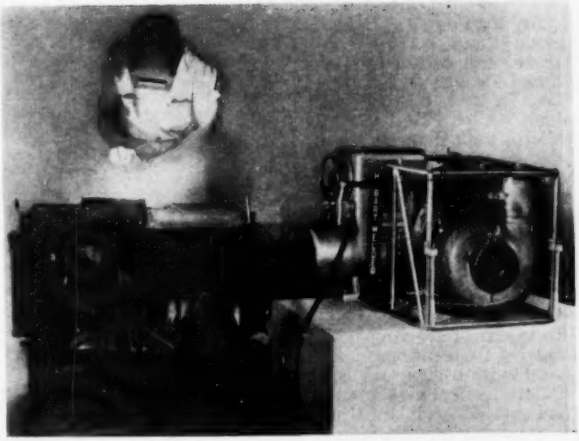
It will grind either straight or tapered shank 2 lip twist drills and has a drill capacity of from .062" to ½" diameter to any included angle 80° to 160°.

Use ACTION Card, opposite page 64. Encircle No. 48



Turbine type arc welder

The first arc welder to use a gas turbine as a prime mover has been developed by Hobart Bros., scientific research division, Dept. BB, Troy, Ohio.



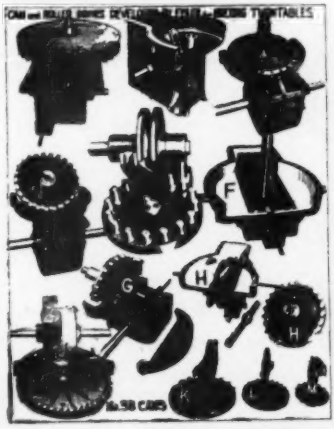
Pictured here is a 250 ampere capacity dc welding generator that was successfully operated and tested under actual working conditions. It is not a commercial venture.

The company, in building this special unit, is primarily interested in knowing more about the gas turbine and the possibilities it might hold for use in building more compact, lighter weight equipment. Greatly reduced weight and size are decided advantages, it is claimed. The turbine type of power may be the answer to lighter airborne equipment that could be transported in smaller aircraft than the present cargo plane.

Use ACTION Card, opposite page 64. Encircle No. 29

INDEXING TURNTABLES AND POSITIONERS

Eisler makes over 100 different types for welding, brazing, soldering, spraying, glass insulators, melting and glass glazing with rotating stations and motorized or hand operated. Rotating tables of all kinds for over 33 years. We supply any part or complete equipment and we make special turntables to your order and cams made to order.



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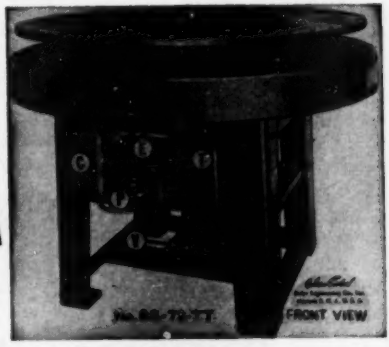
CAMS



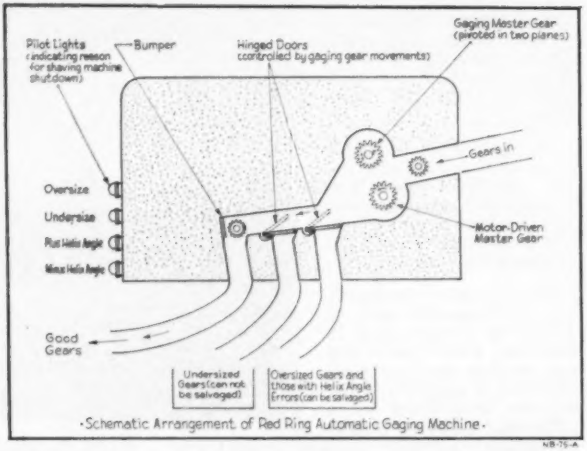
DR. CHAS. EISLER M.E., PRES.

EISLER ENGINEERING CO., INC., 762 So. 13th Street, Newark, N. J.

Gaging and sorting machine inspects and sorts gears automatically

An automatic gear gaging and sorting machine, announced by National Broach & Machine Co., Dept. MTB, 5600 St. Jean Ave., Detroit 13, Mich., makes up to four checks on gears for both size and helix angle accuracy.

When used to inspect spur or helical gears before shaving operations, the machine may be adapted to check size only. When checking helical gears following gear shaving operations, the combination size and helix angle check is made. Built-in controls shut off the shaving machine after a predetermined number


Pilot Lights (indicating reason for shaving machine shutdown)
Bumper
Hinged Doors (controlled by gaging gear movements)
Gaging Master Gear (pivoted in two planes)
Gears in
Motor-Driven Master Gear
Oversize
Undersize
Plus Helix Angle
Minus Helix Angle
Good Gears
Undersized Gears (can not be salvaged)
Oversized Gears and Those with Helix Angle Errors (can be salvaged)

·Schematic Arrangement of Red Ring Automatic Gaging Machine·

NB-75-A

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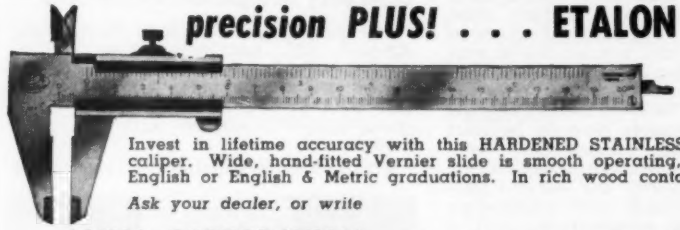

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of reject gears are produced.

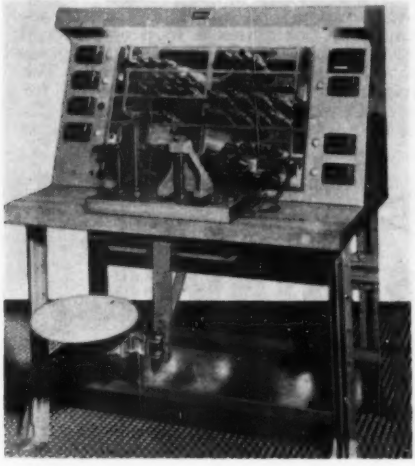
Gears that meet inspection requirements are directed through a chute in the base of the machine. Undersize gears are directed to another feed chute. Those which are oversize and have errors in helix angle are directed through still another chute. Gears can be fed through the gaging machine at rates corresponding to the high speed production rates of rotary shaving machines.

Signal lights on a control panel at the front of the machine indicate which of the four conditions (oversize, undersize, plus helix angle or minus helix angle) caused the gaging machine to shut down the shaving machine.

Use ACTION Card, opposite page 64. Encircle No. 49

Automatic tool control panels

Scully-Jones and Company, Dept. B, 1901 S. Rockwell St., Chicago 8, Ill., is producing special tool control panels, Toolitrols, with automatic counting and signaling devices.



Designed to co-ordinate at-the-machine functions of presetting, storing, and changing cutting tools, they are built special for each new or existing machine installation, including round-the-table, single-end trunnion, double-end trunnion, and various combinations of way-type machines and semi-standard drill heads.

Each machine station and spindle is represented by at least one corresponding station on the Toolitrol, with a name-

CLIPPER

PRECISION DIAMOND TOOLS

Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
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Manufacturers of
DIAMOND WHEELS
and Hones of highest quality.
Prompt deliveries.

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Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.
21-D W. 46 ST. N Y 36

plate identifying tool sizes, station numbers, tool numbers, and adapter sizes. To automatically control tool changes, counters on the unit are set for a predetermined number of machine cycles, and a light signals the operator as to the particular tool or tools he should change.

Operating advantages claimed include: accurate tool setting, elimination of cut-and-try methods, minimum downtime for tool changes, simplicity and ease of programing tool changes, and elimination of in-the-machine adjustments.

Use ACTION Card, opposite page 64. Encircle No. 50

Multiple Spindle Magazine Feed Power Screw Driving Machines

Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.

Part Feeder

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.

COOK & CHICK CO.
640 SOUTH MILLER ST.
CHICAGO 7, ILLINOIS

Light duty straightener is improved

The U. S. Tool Co., Inc., Dept. BTM, Ampere, N.J., has brought out an improved version of its light duty power driven straightener, arranged with a variable speed drive unit in place of the single speed motor furnished with the older models.

Unit shown is suitable for material up

to 6″ in width and ⅛″ maximum in cold roll steel. Other models are of 10″ and 12″ capacity.

The mercury switch loop control arrangement maintains a loop of material between the straightener and the press or machine with which it is used. The straightener can also be employed for material which comes in strip form.

Use ACTION Card, opposite page 64. Encircle No. 51

CLOSED — TRADE AUTOM MARK — CLOSED

Plain Type — Offset Type

OPEN — OPEN

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET — SEMI-OFFSET

AUTO MOULDING & MFG. CO.
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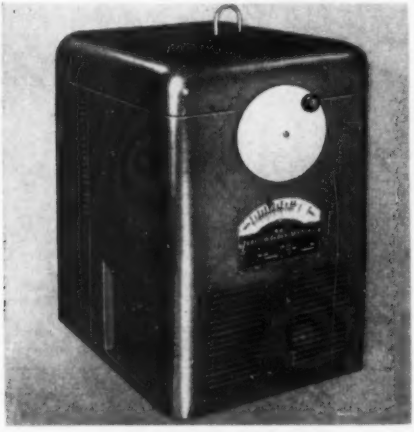
CHICAGO 19, ILL.

SPECIFICATIONS:
Open width ⅞" to 6"
Gage Material .040 to .125
Pin Diameter .101 to ⅜
Lengths to 120"

AC type welder

The Lincoln Electric Company, 22801 St. Clair Ave., Cleveland, Ohio, has announced the Fleetwelder Special, available in 300, 400 and 500 ampere, NEMA rated, sizes.

It is a heavy duty AC welder for production welding, and has a free circuit reactor control of welding current, sepa-



rate from the main transformer, which can be adjusted continuously through a wide range of currents. The control is also sensitive to various welding conditions and responsive to changing arc conditions. The machine is equally adaptable to sheet steel or heavy plate; can be supplied with or without power factor correction.

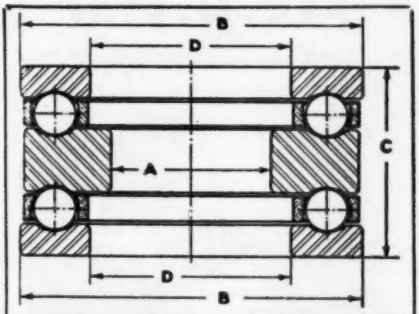
Use ACTION Card, opposite page 64. Encircle No. 52

48" gage for surface plate checking of larger work pieces

Fast surface plate checking of larger work pieces is provided by a new, 48" model Pla-Chek gage offered by Cadillac Gage Co., Dept. MT, Detroit, Mich.

Without the necessity of auxiliary gage blocks, dimensions are established in 15 seconds or less; dimensions are taken directly from the surface plate or from a base line on the work. Accuracy is claimed to .0001" in any 24" length or .0002" over the entire 48" range of the measuring bar.

Heart of the self-contained gage is a deep-frozen, stain-free steel alloy bar. At the top of the bar a large micrometer



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Can also be furnished with self-aligning washers.

ALL TYPES OF THRUST BEARINGS

We can make them up to 25" outside diameter. We are geared to handle all of your thrust bearing needs.

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PORTABLE BAND SAW BLADE

WELDER

...With Built-in Grinder

3/4" capacity

If you've been troubled with band saw blade breakage investigate this Bren/Weld unit built on the new Vibra-Forge principle. It gives you:

- PERFECT WELDS.
- NO BREAKAGE.
- NO FAILURES.
- WEIGHS ONLY 35 LBS.
- OPERATES ON 110 V, AC.
- UNCONDITIONALLY GUARANTEED.

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*Pat. appl'd for

Mfg'd by Bronnen, Bucci & Weber, Inc., N. Y. C.

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LONG — 18¼"
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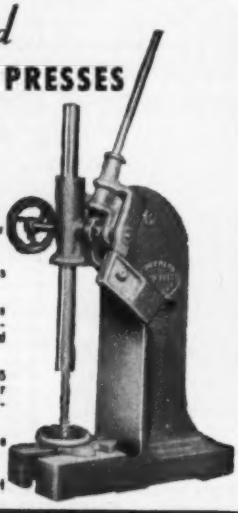
CE Station, Bridgeport 5, Conn.

Greenerd ARBOR PRESSES



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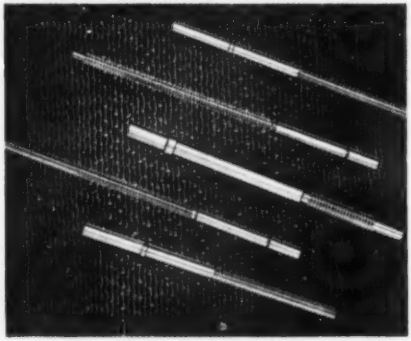

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CLUSTER GEARS • RACKS • INTERNALS • ODD SHAPES

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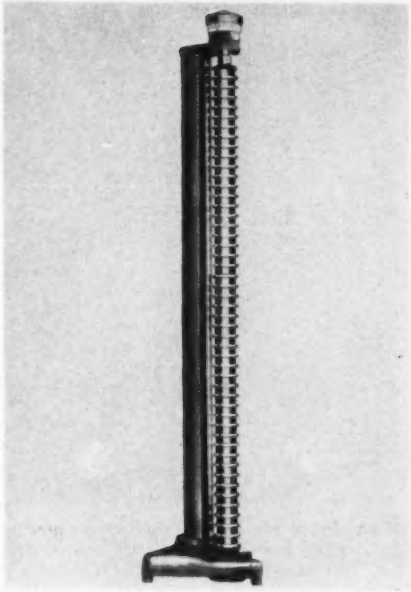
Beaver Gear Works Inc.

1033 PARMELE ST. ROCKFORD, ILLINOIS



thimble graduated to .0001″ provides intermediate dimensions between the bar's 1″ steps. With use of a reverse checking plate, a height gage indicator is easily set for checking the underside of workpieces. Use of inside micrometers, telescoping gages and internal cylinder gages is provided by settings between the reverse checking block and gaging button on the base.

Use ACTION Card, opposite page 64. Encircle No. 53

Surface grinder features rigidity, high table speeds

An improved 14″ hydraulic vertical surface grinder of more rigid design throughout and higher table speeds has been announced by Pratt & Whitney, division Niles-Bement-Pond Co., 22 Charter Oak Blvd., West Hartford 1, Conn. The machine, Model D, is available in either a 14″ x 36″ or 14″ x 60″ size with solid ring wheel or 17″ x 36″ or 17″ x 60″ size with segmental wheel.

Increased length and depth of the heavily ribbed bed give greater support to the table and column. Wider wheel head ways together with an increase in the column bearing length provide the

Hammond of KALAMAZOO

2 IN 1

NO-DUST GRINDER

SAVE OVER 80% FLOOR SPACE THE HAMMOND WAY

DUST-LADEN AIR IS A MENACE!

- Protect your employees' health.
- Protect nearby machine tools from dust and grit.
- Save floor space — requires only 6½ square feet. For 10", 12", and 14" wheels. Write for Catalog.

Hammond Machinery Builders

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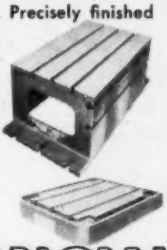
Snow Extension Bases and Box Tables increase radial drill versatility and production . . . make difficult, expensive set-ups fast and easy. Precisely finished from Mehanite castings. They assure work accuracy, plus maximum service life and dependability. All T slots machined.



Send for bulletins BA-3-53 and 54.

Dept. MT

Ferdinand J. SNOW COMPANY MACHINE TOOLS

333 Old Hook Rd., Westwood, N. J. WEstwood 5-3271

Hand operated brake forms many shapes

A hand operated, universally adjustable sheet metal brake, claimed to be capable of forming many shapes which could be formed only on a press brake, has been introduced by R. E. Smith, Dept. BB, 1122 Elizabeth Ave., Waukegan, Ill. The unit will accommodate 18 gauge sheets up to 26" wide, or progressively narrower widths and thicker gauges up to 3/16" mild steel 1¼" wide. 180° flanges up to 1¼" wide may be formed in one operation without repositioning the work. Wider flanges can be formed to any angle up to 164°.

Because the center line of the segmented upper mandrel fingers, which is both the work hold-down and the axis around which the bend is made, is always on the center line of the hinges, true radius bends are insured, regardless of the thickness of the metal being formed. Any radii can be furnished up to ½".

Selective bending of portions of a sheet, such as flanging the inside of a square or rectangular hole, or the square throat

of an elbow, is accomplished by removing any of the lower fingers that would distort the sheet while the bend is being made.

Use ACTION Card, opposite page 64. Encircle No. 54

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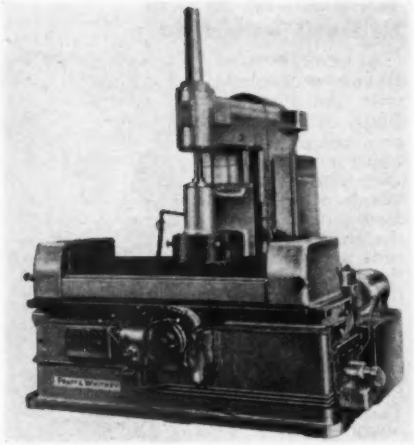


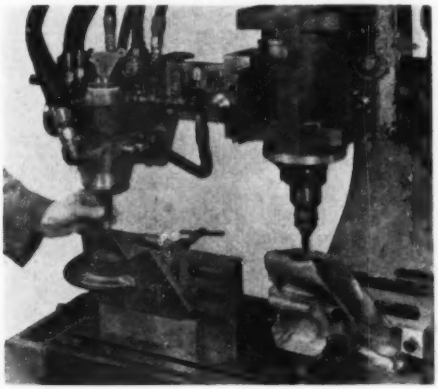
spindle head with additional support. The spindle is made heavier with more rigid bearing construction. The wheel flange is an integral part of the spindle. Approximately a 25% increase in the weight of the grinder has resulted because of this new design.

Higher table speeds variable from 2 to 100 feet per minute permit the use of harder, longer lasting wheels. This range is claimed to provide a grinding speed for almost any material.

Use ACTION Card, opposite page 64. Encircle No. 55

Hydraulic tracer traces 360° in all directions

The 3-dimensional True-Trace Model

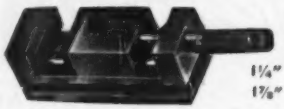


A-3D hydraulic tracer traces 360° in all directions; converts a miller or other accurate metal cutting machine tool into a three-dimensional duplicator insuring tolerances to as close as .005" to .0005".

New cutting control techniques are claimed to allow for positive and constant feed rates, independent of varying operator pressure on spindle. Rate controls enable the operator to make feed rate changes quickly. True-Trace Sales Corp., Dept. B, 2303 Chico Ave., El Monte, Calif.

Use ACTION Card, opposite page 64. Encircle No. 56

PRECISION TOOLMAKERS VISE



1¼" Jaw $18.40
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Precision ground square and parallel to .0004/In. non-cumulative. Ground dovetailed slide. Hardened and ground jaws. Dustproof enclosed screw. Ample clamping grooves. Excellent for jib-boring, precision grinding, inspection. 10 day money-back GUARANTEE.

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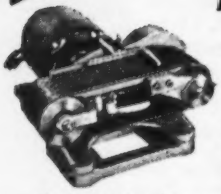

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

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333 Nassau Avenue, Brooklyn 22, N. Y.

Wet-blast unit for multi-unit installation

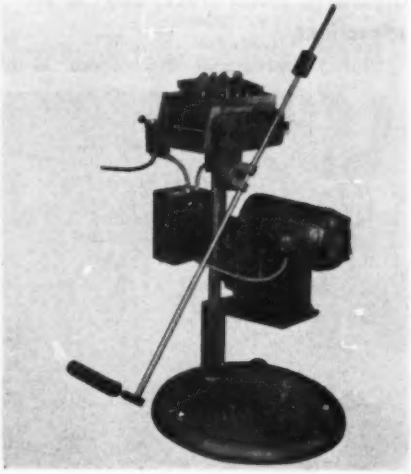
A new Pressure Blast wet-blast unit, the Pressure Blast, Jr., recently announced by the Cro-Plate Co., Inc., Dept. BTM, 747 Windsor St., Hartford 5, Conn., was designed for multi-unit installation in the larger plant or the smaller shop where the compressed air supply for the operation of this type of equipment may be low. The unit may be operated in conjunction with a 3 hp compressor.

Features are: motor-driven paddle-type agitator for the water and abrasive mix; self-supporting trigger gun to reduce operator fatigue; foot pedal window wash actuator. A venturi in the blast gun raises the abrasive and water mix up from the hopper.

Use ACTION Card, opposite page 64. Encircle No. 57

Variable speed stock straightener

A variable speed stock straightener has been developed by Cooper Weymouth,



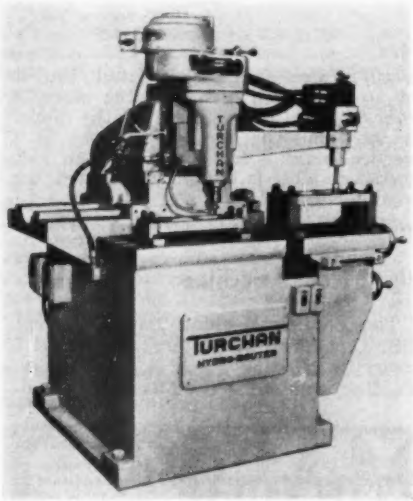
Inc., Dept. MTB, 277 Noble Ave., Bridgeport 8, Conn., for use with presses, shears or slitters or alone, to straighten small parts and materials. When used in combination with feed-equipped presses, it will automatically maintain stock in a free loop even though the press is run intermittently, it is claimed.

The machine operates at controlled speeds from 10 to 50 fpm, in models with five, seven or nine rolls and to handle stock from 2½" to 12" in width, straighten stock up to ⅛" in thickness.

Use ACTION Card, opposite page 64. Encircle No. 58

Automatic tracer-controlled milling and routing machine

A new automatic tracer-controlled milling and routing machine, the Hydro-Router, being marketed by Turchan Follower Machine Co., Dept. MT, 8259 Livernois Ave., Detroit 4, Mich., is claimed to adapt quickly and easily to change-overs.



Finger-tip operation provides effortless positioning of vertical spindle slide, ram, and ram slide. The tool reproduces the form dictated by tracer stylus in contact with master.

Hydraulic feeds are of infinitely variable feed rates with stepless automatic tracer control, said to produce a consistently good surface finish.

Use ACTION Card, opposite page 64. Encircle No. 59

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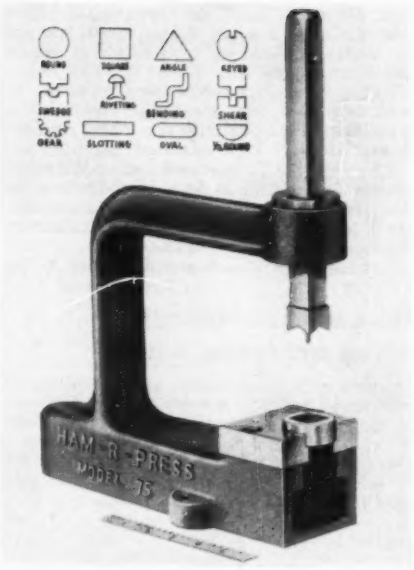
Holes of many shapes cut with tool

A hand operated punch press type tool, the Ham-R-Press, designed to cut various shapes in metal—up to 1¼" in dia. and up to 14 gauge—is being manufactured by the Chase Mfg. Co., Dept. B, 5008 W. Jefferson Blvd., Los Angeles 6, Calif.

Hammer pressure is transmitted through the vertical ram directly to the working point. The pressure on the back and arm of the frame is eliminated. The frame is



made of aircraft alloy aluminum, said to be stronger than cast iron. The movable ram is precision piloted in the upper frame arm. The ram's movement in a vertical plane is free and alignment with the work table is always maintained, the manufacturer claims.

Use ACTION Card, opposite page 64. Encircle No. 60

Jig grinding machine

The Fosdick Machine Tool Co., Dept. BB, Cincinnati, Ohio, has announced a new jig grinding machine, the Moore-Fosdick, combining the Moore jig grind-

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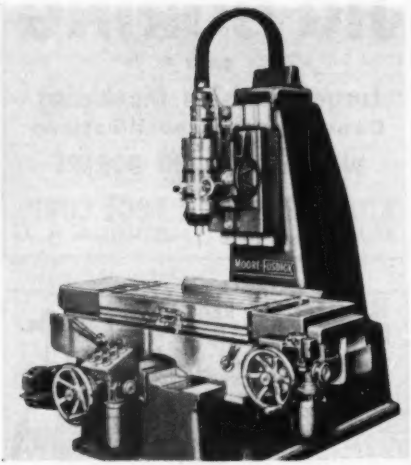


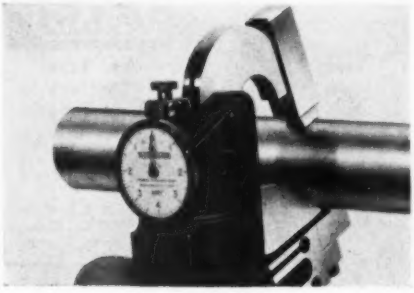
ing head with the Fosdick automatic positioning table, that automatically positions work to ± .0001".

The machine will grind cylindrincal as well as conical holes with tapers in either direction. An angular and indexing device built into the main spindle and the newly developed slot grinding attachment are claimed to permit grinding of any contour—regular or irregular.

Grinding speeds run from 12,000 to 60,000 rpm. Features of the grinder include larger table size, greater work height, greater power. Maximum work size is 22" x 42" x 27" height. Machine includes four spindle speeds: 90, 120, 180, 240, by air-powered hydraulic control. Travel of the main spindle on slide is 3⅝". Spindle is adjustable up to 1½° either way or 3° included angle.

Use ACTION Card, opposite page 64. Encircle No. 61

Indicating snap gage made adjustable



Federal's line of single-purpose indicating snap gages (Model 1340) now includes two new models having adjustable upper contacts. Model 1340 P-20 has

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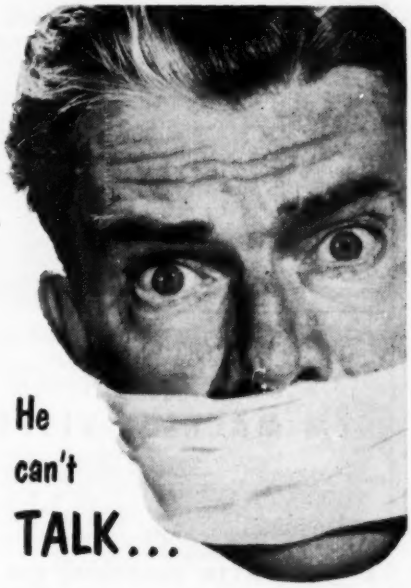

(So we'll say it for him.) The ingenious new SMITH'S "Flo-Trol" design eliminates back-fire and prevents burned-out valve seats in Smith's oxy-acetylene cutting torches. It's fool-proof. You can't go wrong.

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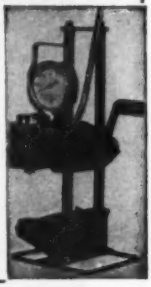

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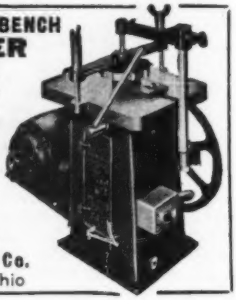

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3¼" stroke; adaptable for other work.
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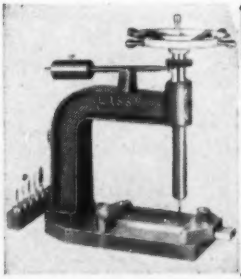

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Sets new standards for accuracy, efficiency, time and taps saved. Free 6 page circular

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a capacity of .062″ to .625″ and Model 1340 P-21 a capacity of .625″ to 1.250″. Adjustments are made by sliding the upper or reference contact along the upper arm of the gage. It is locked in position with a sunken hex-head screw.

The narrow anvils enable the user to measure close-up to sharp corners and to check narrow grooves. The reading is not influenced by the weight of the gage, nor of the user's hand because all weight rests on the upper anvil, which is the reference or non-sensitive contact. Federal Products Corp., 2512 Eddy St., Providence, R. I.

Use ACTION Card, opposite page 64. Encircle No. 62

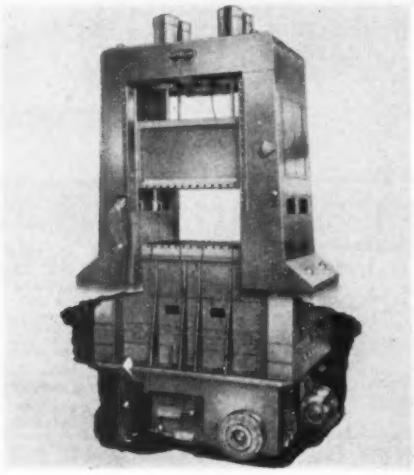
Four point underdrive press

A new Cleveland four point underdrive press is double geared, twin drive, arranged with air counterbalance to the slide and air brake on the flywheel to bring it to a quick stop when the power is shut off. The press is equipped with a dynamic clutch and is arranged with pneumatic cushions in the bed.

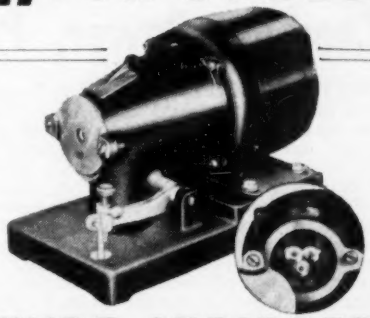
With this underdrive type of construction, maintenance is claimed to be easier and adjustments or repairs can be made at convenient floor level.

Stroke is 20″; slide and bed area, 60″x 80″; capacity, 450 tons. Cleveland Punch and Shear Works Co., E. 40th & St. Clair Ave., Cleveland, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 63



HIGH SPEED



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Heavy Duty Surface Grinders Combine Power, Precision

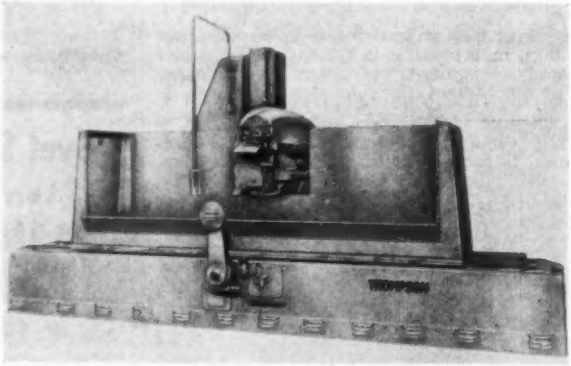
THE THOMPSON Type CX hydraulic surface grinders, for heavy duty production, are massively built with heavy base and single column design, and are claimed to provide rapid removal of stock while maintaining close limits and fine finish.

Features are: cross feeding wheelhead with horizontal spindle grinding with the periphery of a 20" diameter wheel; rapid and accurate positioning of wheel to work; simplified, centralized control; flame hardened cross slide ways; in position wheel truing; direct-coupled motor drive to wheel spindle; low pressure hydraulic system; automatically lubricated ways, slides and spindle bearings; separate cooling system; way protection; antifriction elevating nut; non-adjustable steel back silver lined front spindle bearings; simplified electrical control; manual cross feed; sizes from 30" x 26" x 72" to 36" x 36" x 24" (or larger).

Auxiliary equipment for the CX includes: automatic down feed; micrometer backup stop; dust exhauster attachment; coolant through wheel; angular wheel truing; auxiliary hand table feed; Hoglund Magniform contour dressers; coolant filter; magnetic coolant separators; wheel balancing ways and arbors; electric double angle wheel truing; manual fine cross feed; raised elevation; rectifiers and neutrolators for chuck; demagnetising switches and motor generator sets; Delpark coolant filters. Thompson Grinder Co., Dept. BB, 1534 W. Main St., Springfield, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 28

The Thompson CX hydraulic surface grinder illustrated is equipped with auxiliary raised elevation attachment and swinging pushbutton station. The size is 36"x48"x120". Table speeds of all CX's are 10 to 100 fpm with vertical feed hand wheel graduated to .0005 and powered at 15 ipm.



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Drop-forged model with chrome finished micrometer head, from $8.25 up. Ask for Micrometer Catalog

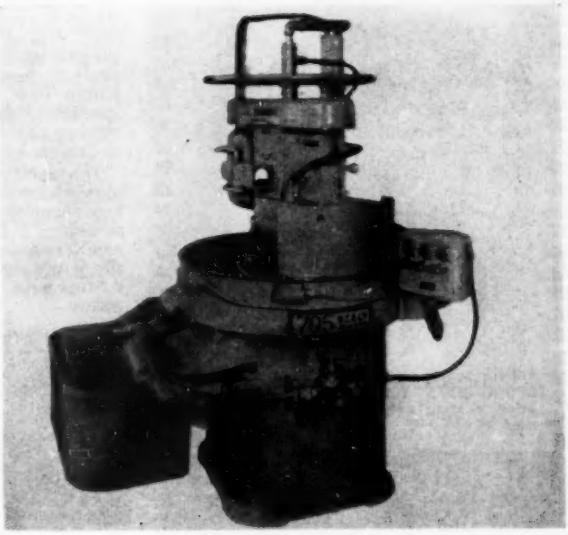
No. 901 C 0-1" Size with LOCK NUT and RATCHET and 10th vernier as shown $13.25

This tool with TUNGSTEN CARBIDE tipped anvils $15.75

GEO. SCHERR CO., INC. 200 MT LAFAYETTE STREET • NEW YORK 12, N. Y.

Six fins of water pump impeller blades ground to 15° angle on disc grinder

The six fins of water pump impeller blades are ground to a 15° angle on this No. 705 wet Besly-Bowen grinder. The abrasive wheel is sheared across the blades which are rotated rapidly during the grinding cycle. Approximately 1/32" of stock is removed in a single pass, grinding the work to size and correct angle.

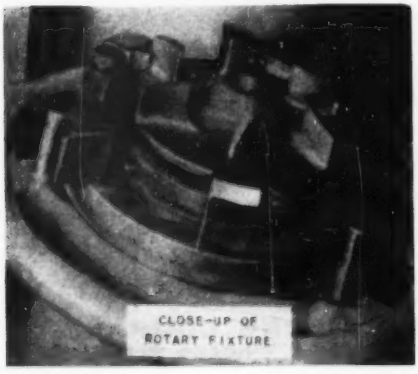


The parts are ground wet with coolant carried directly into the grinding area through the hollow wheel spindle.

The operator places an impeller over a center pilot of the fixture and down onto three rest buttons where it is clamped in place by three spring actuated clamp dogs arranged to work simultaneously from the fixture handwheel.

After securing the work in place, the cycle start button is depressed. This causes the grinding head to swing to the left at rapid traverse rate and the fixture to start rotating. Before the grinding head reaches the work it slows to feed rate and passes across the impeller, removing the required amount of stock in a single pass.

The grinding head now reverses and



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Name Plate Stamping Machine in several models—HAND—FOOT AND POWER Operated.

For parts stamping and a variety of lettering and numbering jobs.

Write to the "ORIGINAL MARKING SPECIALISTS" for complete information upon a wide range of marking equipment.

THE ACROMARK CO.
15 MORRELL ST. ELIZABETH 4, NEW JERSEY

returns to the starting position at rapid traverse rate and the fixture rotation stops to complete the cycle. Charles H. Besly & Co., Dept. B, Beloit, Wis.

Use ACTION Card, opposite page 64. Encircle No. 64

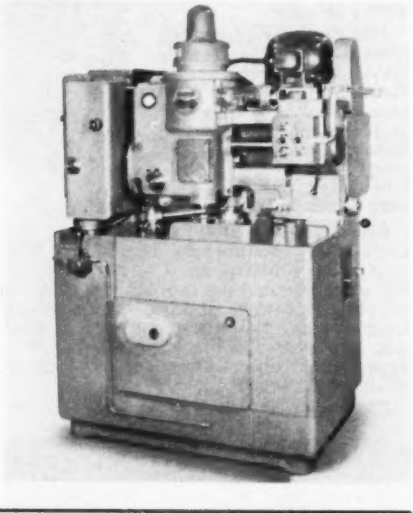
Gear shaper capacity is 6" pitch diameter

The No. 4GS gear shaper, placed on the market by the Fellows Gear Shaper Co., 78 River St., Springfield, Vt., has a capacity of 6" pitch dia. and 2" face width for external and internal spur and helical gears. The maximum diametral pitch is 5/7 for spur gears, and 6 for helicals.

Machine uses a 4" pitch dia. cutter mounted on a 3⅜" dia. cutter-spindle which is reciprocated through a 2½" rockshaft driven from a crankshaft. The drive to the crankshaft from the main drive shaft is through a pair of pick-off gears which can be changed to give cutter-spindle speeds ranging from 98 to 635 strokes per minute. The main drive shaft is driven by a 1½ h.p., 1200 r.p.m. motor.

The rotary feed of cutter and work is also governed by pick-off gears providing feeds ranging from 0.008" to 0.024" per stroke of a 4" pitch diameter cutter. The relation between the number of teeth in the work and the number of teeth in the cutter is maintained by compound change gears.

Use ACTION Card, opposite page 64. Encircle No. 65



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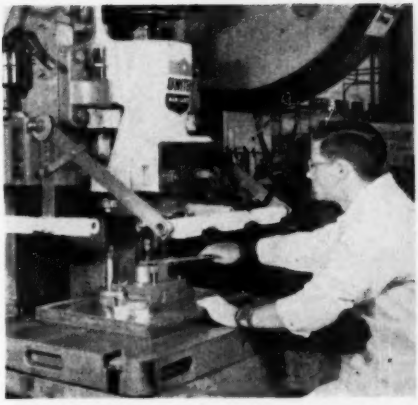
Pictured here are a pair of "Bikini bracelets" being worn by a United Air Lines press operator. Transmitting a steady multi-directional signal as they near Geiger tubes located at the boundary of a danger zone, the bracelets cause detectors to activate an electronic relay which locks production machinery, preventing crushed arms and hands. Hazatrol Corp., Dept. B, 215 Market St., San Francisco, Calif.

Use ACTION Card, opposite page 64. Encircle No. 66



12" metal cutting band saw

The 12-inch metal cutting band saw, product of Atlas Press Co., 2450 N. Pitcher St., Kalamazoo, Mich., is a two-speed machine for trimming and contour sawing a wide range of metals—from iron and steel, including stainless and high carbon—to brass and copper.

The saw cuts to the center of a 24" circle. Has 6¼" capacity above 14"x14" tilting table, two blade speeds of 100 and 250 fpm. The heavy-duty speed reducer is driven by V-belt from motor, and power is transferred to saw through two

Guaranteed Accuracy at Low Cost

5" Sine Bar $18.75
5" Sine Plate $32.50
10" Sine Plate $80.00
(Solid Oak Case Extra)

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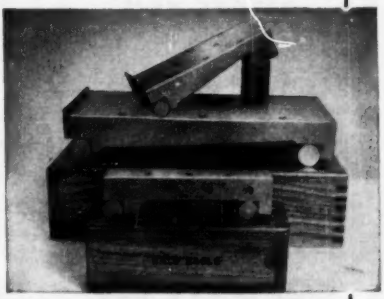
These precision ground sine tools are accurate to .0002" in center distance and parallelism, for the length of the tool. Convenient tapped holes and sturdy end plates make setups easy.



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Number	Center Distance	Width	Shipping Weight	Price with Oak Case
1605	5" ± .0002"	3"	7 lbs.	$38.00
1610	10" ± .0002"	5"	23 lbs.	$88.00
1705	5" ± .0002"	1"	3½ lbs.	$21.75

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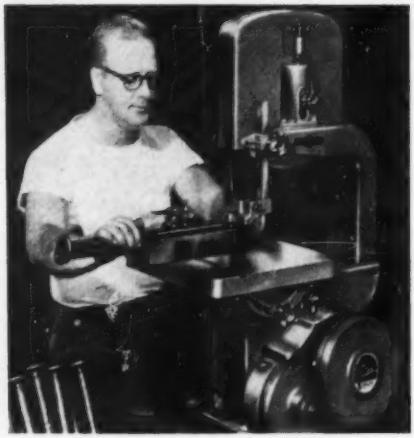
Bald Eagle Tool Company

Newton Building, St. Paul 1, Minn.

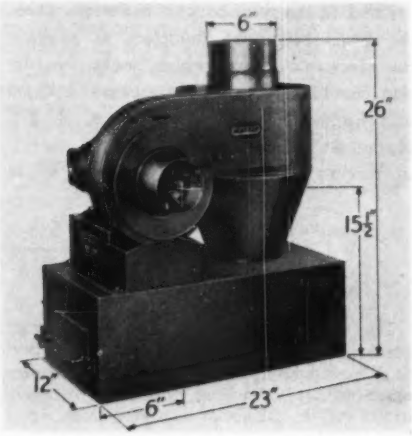


sets of hardened sprocket wheels, and roller chains. Ground sprocket wheel shafts turn on sealed-for-life ball bearings. Saw base and arm are heavy iron castings that are said to reduce vibration to a minimum.

Use ACTION Card, opposite page 64. Encircle No. 67

Midget size dust collector

Model 5N20 Dustkop manufactured by Aget-Detroit Co., 205 Main St., Ann Arbor, Mich., was designed especially for the control of dusts from individual dust creating machines or those remotely lo-



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cated from a general dust control system. Rated at 558 cfm on a 4" inlet; a multiple blade paddle wheel fan of the self-clearing type direct driven by a continuous duty 1/3 hp motor permits the collector to be used where dusts having fibrous content of considerable length are present.

Dust is retained in the dust compartment which comprises the entire base of the collector. The cleaned air, together with any toxic gases, smoke and obnoxious odors, is exhausted outdoors through the 6" diameter exhaust connection at the top of the cyclone.

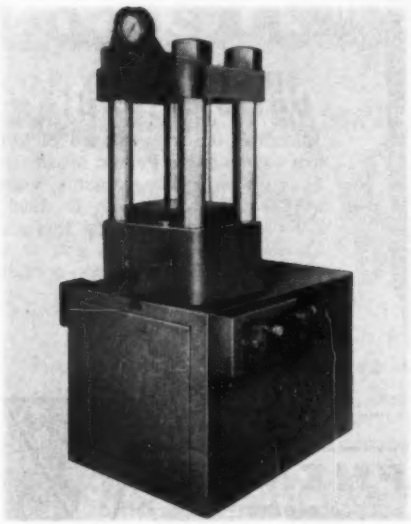
Use ACTION Card, opposite page 64. Encircle No. 68

Hydraulic system features all subplate mounted controls

The M & N Hydraulic Press Co., Dept. BB, Clifton, N.J., has announced the development of a new hobbing press that utilizes a simplified hydraulic power system, which eliminates "in line" mounted hydraulic controls. By omitting a large number of joints, the M & N system reduces pressure losses through pipes and fittings, and eliminates many of the sources of possible leakage.

The new system is designed with a solid steel subplate which serves as a readily accessible mounting for all necessary control valves.

Use ACTION Card, opposite page 64. Encircle No. 69



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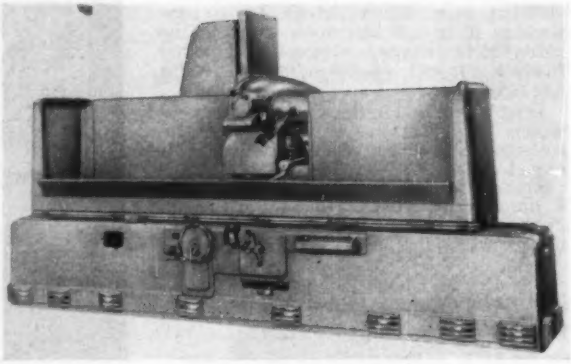
CHICAGO MANUFACTURING AND DISTRIBUTING CO.

New line of surface grinders



The Thompson Grinder Co., Dept. BB, Springfield, Ohio, has announced a new line of production surface grinders, Type C, ranging in size from 12″ x 48″ to 24″ x 166″.

Principal features are: 20″ dia. wheel cross-feeding with horizontal spindle and grinding with periphery of wheel; anti-friction elevating nut to eliminate windup between nut and screw; power elevation and hydraulic rapid traverse with safety stops; in-position wheel truing; hydraulic table speed and cross feed levers grouped at operating area and simplified with table speed variable from 10 to 100 f.p.m. and with cross feed control in increments of 1/32″ to one half of wheel width per table reverse; fast sparkout plus small increments of down feed and wide increments of cross feed at 100 fpm table speed; motor built into wheel head and mounted directly on spindle; low pressure hydraulic system; automatic lubrication; separate coolant system.

Use ACTION Card, opposite page 64. Encircle No. 30

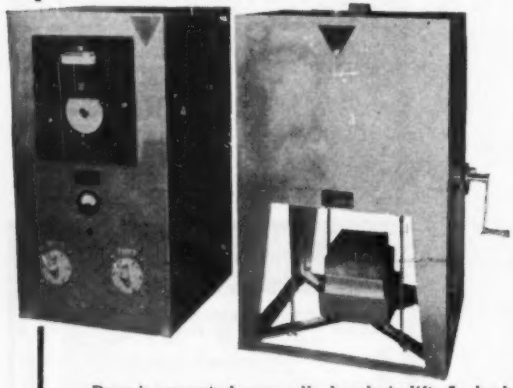
INVERTED PIT-TYPE FURNACE

by

PERECO

for

bottom loading



Affording the convenience of bottom loading this Pereco Model IP-74 is an especially versatile, wide temperature range (up to 2900° F.) electric laboratory furnace. Chamber size is 9″ w. x 9″ l. x 10″ d. and has 4 silicon-carbide elements on each side.

Door is operated manually by chain lift. Arch plug can be provided for exhausting and rapid cooling. Furnished complete with transformer, 36-tap switch, ammeter and magnetic contactor. Temperature controls as required.

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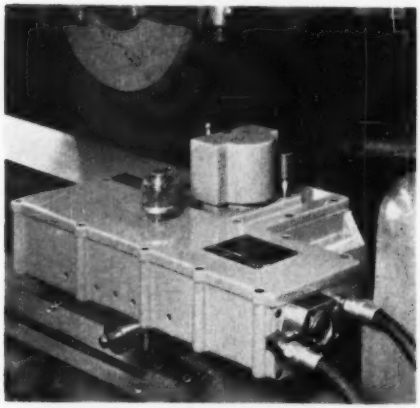
PERENY EQUIPMENT CO.

Dept. Y, 893 Chambers Rd. Columbus 12, Ohio

Wheel dresser for surface grinders

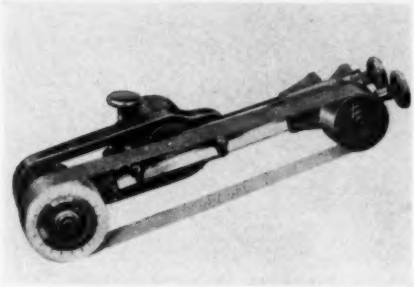
The Hoglund Engineering & Manufacturing Co., Inc., Dept. B, 340 Snyder Ave., Berkeley Heights, N. J., has introduced a new model to its line of automatic grinding wheel dressers. The Model 32 is designed for surface grinders and is hydraulically operated. It can be used for any type of form that can be entered by the diamond. To set up for each job, the operator simply removes cover plates and changes contour templates. A hydraulic valve actuates the diamond movement across the wheel and speed control valves adjust dressing speed. Pantograph linkages are completely eliminated. Reduction is made from the enlarged template by means of cams in the form of inclined planes.



Use ACTION Card, opposite page 64. Encircle No. 70

Contact wheel belt grinder

Model 500 contact wheel belt grinder,



APEX INSERTED-BLADE METAL-CUTTING TOOLS

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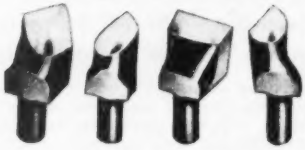
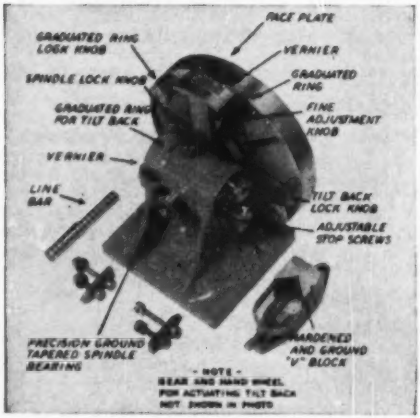


A type for every job

If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Prompt shipments from our large stock. Write for catalog.

APEX TOOL & CUTTER CO., Inc. **SHELTON 14, CONN.**

The COOK "MULTICHECK"



Standard Equipment as shown includes "V" block and clamp, toe clamps, bolts and alignment bar with No. 3 Morse Taper to fit spindle.

Sized in 10" and 12"
Graduated in 5 minutes or 1 minute of 1°

CUT LAYOUT AND INSPECTION COSTS

Realizing the great need in the machine tool trade for some method of speeding up the tedious methods of figuring angles, setting up sine bars, etc. and in order to layout and check precision work, we have designed and can now offer you the Cook Multicheck. As a precision measuring instrument, the Cook Multicheck ranks in importance with the Vernier Caliper and the Height gage.

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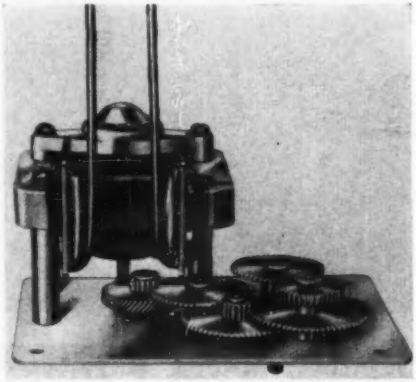
ANDERSON, INDIANA

built by B & E Mfg. Company, Inc., Dept. MB, 407 Liberty St., Kansas City, Mo., is claimed to offer flexibility and maneuverability. It can be mounted in almost any convenient place; has an adjustment of 360 degrees vertically.

Use ACTION Card, opposite page 64. Encircle No. 71

Gear train and motor

The New England Gear Works, Dept. BB, 2012 South End Rd., Southington, Conn., has announced a gear train and motor combination for use on animated



displays, advertising turntables, etc.

Torque of motor at 1 rpm is 60 lb. in. Quiet operation is claimed to have been arrived at through the special cut of the gears and pinions. There is a selection of any speed from 1 to 194 rpm, either clockwise or counter clockwise rotation.

Use ACTION Card, opposite page 64. Encircle No. 72

Color-Glance Brinell hardness tester makes possible automatic operation

Three colored lights, which signal the relative Brinell hardness of the test piece, make all the decisions of acceptability or rejection on a new color-glance Brinell hardness testing machine. When tied in with some automatic means of handling the parts on a production line basis, the unit can be made to physically sort the work after testing, thereby making possible automatic Brinell hardness testing.

The three signal lights are set up so that yellow indicates "too hard," green designates "within range" and red shows "too soft." Limits are easily adjustable to suit the requirements of each job. During the test cycle, one of these lights

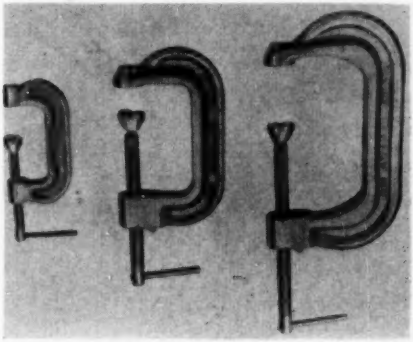
flashes on, indicating the hardness category of the part under test. Made by Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, Mich.

Use ACTION Card, opposite page 64. Encircle No. 73

Aluminum alloy C clamp

A C clamp made of aluminum alloy has been announced by Jergens Tool Specialty Co., Dept. BBC, 712 E. 163rd St., Cleveland, Ohio.

The clamp features replaceable parts, including a copper plated screw with handle, fast-action nut, pressure spring



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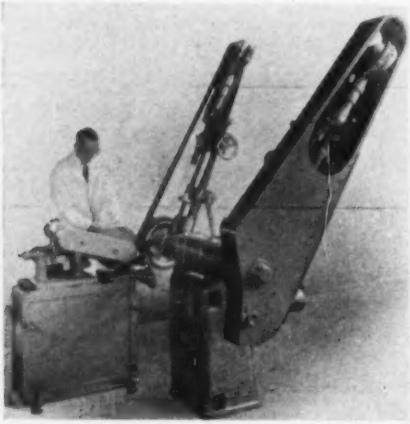
and copper plated shoe. The unit operates by simply pressing the nut, which permits the screw with shoe to drop to the work for instant tightening action.

Use ACTION Card, opposite page 64. Encircle No. 74

Centerless grinding and polishing attachment

A centerless grinding and polishing attachment which can be used permanently or intermittently with existing polishing lathes or backstand equipment has been announced by the Curtis Machine Corp., Dept. B, 1300 E. Second St., Jamestown, N.Y. The machine, Model RSPG, is being made by an affiliate company in Germany.



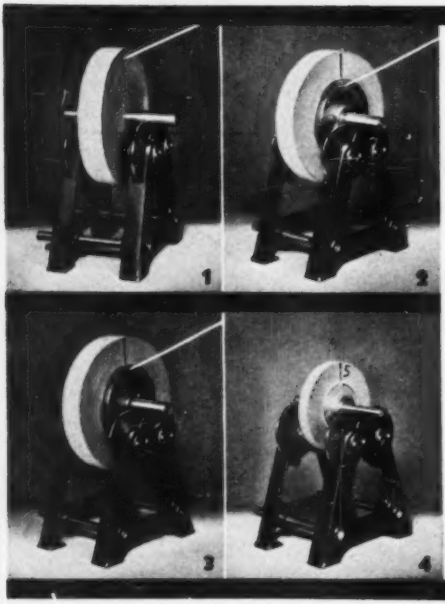
It can be utilized for grinding and polishing with belts or setup wheels, or for polishing with buffs, in combination or in tandem.

Use ACTION Card, opposite page 64. Encircle No. 75

Polishing-buffing machine

On the Model 50-99 polishing and buffing machine, the head is powered by a 3, 5 or 7½ hp, 1750 rpm motor or a 10 hp, 3500 rpm motor. Weight of 1400 lb. is claimed to assure vibrationless operation.

Head has a maximum float action of 4", allowing it to follow the surface or irregular parts. Flat surfaces can be finished without using the floating action. Power wheel feed is available. An am-



QUICK, EASY WAY TO BRING GRINDING, BUFFING, AND POLISHING WHEELS INTO BALANCE . . .

(1) Balance on Anderson super-sensitive Balancing Way and mark light side. (2) Line up mark with both zeros on Anderson Speedi-Balancer. (3) Turn both discs till wheel balances. (4) Record setting. Wheel is now prebalanced for instant use when needed: just use Speedi Balancer, set to number marked, as outside collar. Save time. Eliminate weights. Reduce vibration. Increase motor bearing life. Improve motor performance. For information on sizes, types, and prices of Anderson Balancing Ways and Speedi-Balancers, write for Bulletin 11-5.

ANDERSON BROS. MFG. CO.

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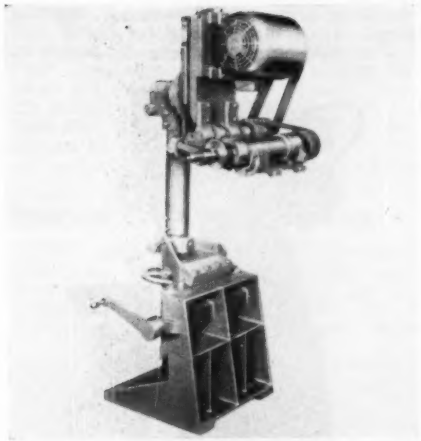
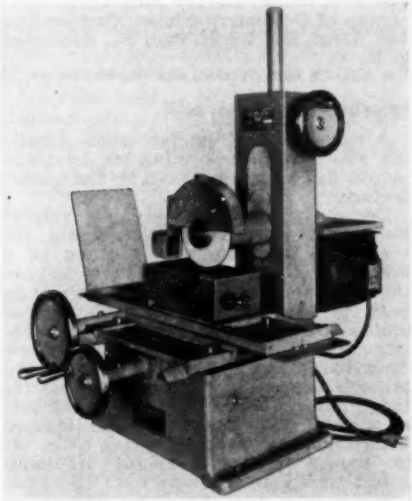


meter is standard equipment, Hammond Machinery Builders, Dept. MTB, 1614 Douglas Ave., Kalamazoo, Mich.

Use ACTION Card, opposite page 64. Encircle No. 76

Dual-purpose surface grinder

The Butterfly precision surface grinder SG-48, a dual-purpose hand-feed bench type surface grinder, claims rigidity and power for heavy cuts combined with high



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Cut any Shape... STRAIGHT OR IRREGULAR

B-3 with Ball Bearing Hold Down

Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All shears equipped with H.C. H.C. Blades for cutting Stainless.

INSIDE SLOTTER

8" Reach — 16 ga. cap.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x⅛" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for Illustrated catalog.

BEVERLY SHEAR MFG. CO., 3005 W. 111th ST., Chicago 43, Ill.

sensitivity for precision finishing.

Both ends of the spindle are mounted in duplex-mounted angular contact ball bearings. Spindle is powered by 1/3 hp 3450 rpm motor. Harvey Mfg. Corp., subsidiary of Germanow-Simon Machine Co., Inc., Dept. BB, 408 St. Paul St., Rochester 3, N. Y.

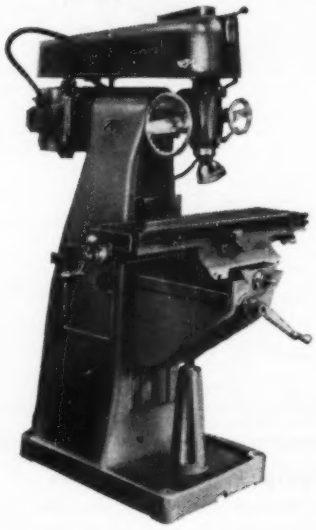
Use ACTION Card, opposite page 64. Encircle No. 77

Improved vertical mill

A new model of the U.S. vertical milling machine, incorporating six improvements, has been announced by the manufacturer.

Design improvements are: (1) relocation of the vertical feed handle for greater convenience; (2) addition of a micrometer dial, giving accurate indication of table setting or movement on both ends of the table; (3) a hard chrome plated quill which is carried in the precision bored and honed head; (4) a new draw bar which speeds tool changes and protects the tools at the same time; (5) tightening or loosening a single nut sets or releases tools from the spindle taper without danger of dropping the tools; (6) to the conventional telescoping chip guard which keeps chips from the knee screw, a permanently secured plate above the knee gears has been added, keeping chips out of the gearing.

The new improvements have not



BLUE VALLEY FLANGING MACHINES

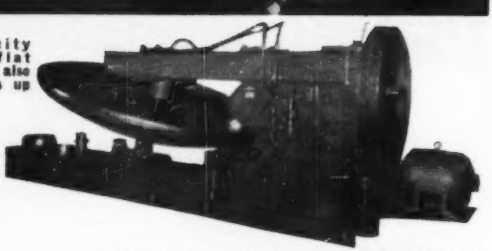
No. 1 10 gauge capacity combination circle shear and flanger; from 14" to 6' diameter flat with support; 12' diameter less support.

No. 3 ¼" capacity flanging flat heads from 18" to 12'.

No. 4 ⅜" capacity flanging flat heads 20" to 12'; also handles standard dished heads up to 12" dia.

No. 5 ½" capacity flanging flat heads 24" to 20'; also handles dished heads up to 12' dia.

No. 6 ¾" capacity for flanging flat heads 28" to 20'; also handles dished heads up to 12' dia.



Above: Machine No. 6, ¾" capacity with ½" head, 8' dia., flanged with 5¾" knuckle radius. Will flange flat, coned and dished heads in all thicknesses up to and including ¾" boiler plate on heads over 6' dia. Heating of metal not required. No head distortion. Will flange all dia. of flat heads from 28" to 20' and all dia. of dished heads from 3' to 12'.

No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from same template without removing work from the machine.

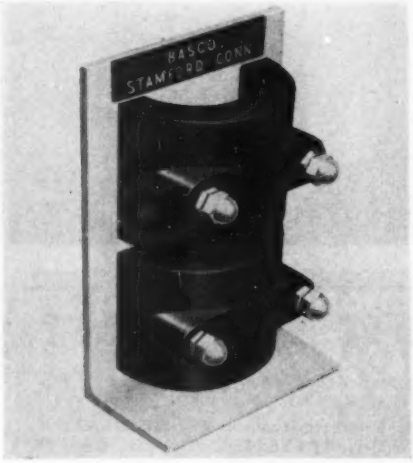
BLUE VALLEY MACHINE & MFG. CO.
6832 Truman Road KANSAS CITY 26, MO.

changed the basic design of the vertical mill. It has a 9½" x 36" table which feeds 24" longitudinally, 9¾" in cross feed and 16½" vertically. A 1 hp, 1200 rpm motor gives six standard spindle speeds from 250 to 2850 rpm. The U.S. Burke Machine Tool Div., Dept. MB, Brotherton Rd., Cincinnati 27, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 78

Separator for light metal sheets

Basco Mfg. Co., Dept. BB, Stamford, Conn., has added the No. 50 Series separator to its line designed for use by manufacturers using light metal sheets. Separator is made in one, two and three



magnet sizes to fit specific needs.

Features claimed: speeds production on feeder lines; protects operators' hands and gloves from injury; eliminates danger of marring painted or polished parts.

Use ACTION Card, opposite page 64. Encircle No. 79

Small air-powered broaching machine

Micro finish is claimed to be available with a new air-powered broaching machine.

The compact unit broaches parts within .0002". Custom made jigs and fixtures make possible a positive hold on workpieces. Machine is said to make grinding, tumbling and de-burring operations no longer necessary. Other features: performs on flat or contour surfaces; replaces complicated form milling cutters

BE SURE!

And you can be sure of accuracy when you use ACME TOOLS in the Shop, Tool Room or Inspection Departments for checking Flats, Angles, or Heights. Made of MEEHANITE METAL, these tools are designed to maintain their rigid precision and give long service even with hard usage.

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Slotted Angle Plates
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Flat Parallels — Lapping Plates
Toolmakers' Knees — "V" Blocks
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Straight Edges (Leveling Type)
Measuring Irons
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Angle Attachments

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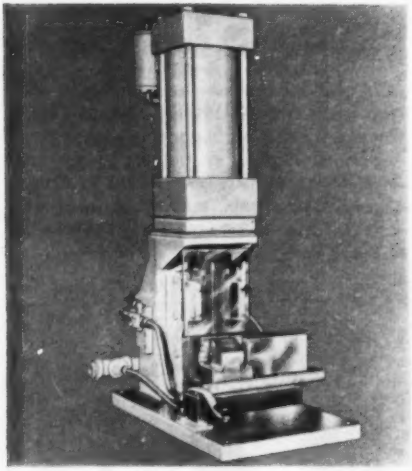
71 W. Broadway **New York 7, N.Y.**

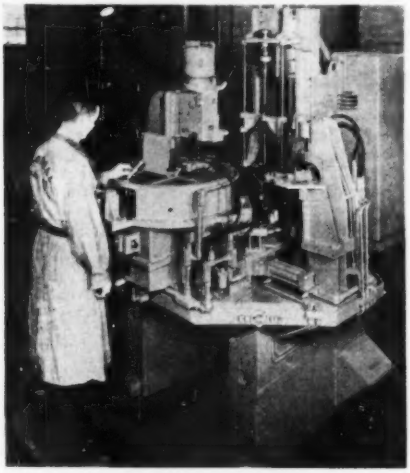


on irregular surfaces with only a single broach. Bond Tool and Mfg. Co., Dept. MTB, Waterbury, Conn.

Use ACTION Card, opposite page 64. Encircle No. 80

Drilling, broaching and stamping operations in one machine

The Colonial Broach Co., Dept. BB, Detroit, Mich., has developed an auto-



The machine shown here was built by Rehnberg-Jacobson, to perform a series of drilling, tapping, and reaming operations.

MAKE IT YOURSELF?

You can do it with **R-J UNITS**

Rehnberg-Jacobson ALL-MECHANICAL Drill, Tap, and Index Units are specially designed for YOU to use for making up YOUR OWN special-purpose machines — or for adding to or modifying some of the special-purpose (or standard) machines you now have. They are accurate, efficient, economical — and available in enough models and sizes to suit most every need. WRITE TODAY for Data Sheets giving complete *engineering information.*

TAP UNITS, for example, are made in four capacities from 5/16 - 18 and 1-1/4" stroke to 1-1/2 - 6 and 4-1/2" stroke. They are self-contained, with lead screw feed.

REHNBERG R-J JACOBSON

REHNBERG-JACOBSON MFG. COMPANY

2135 KISHWAUKEE ST., ROCKFORD, ILLINOIS

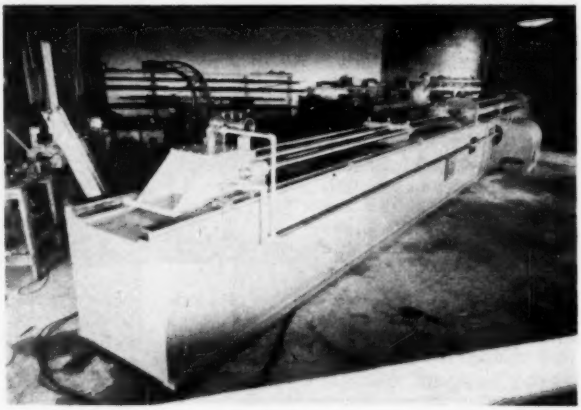
mated 3-station machine to include a drill unit, a broaching machine, and a stamping unit. All individual operations are performed on a single common base in one continuous cycle.

Included in the loading and indexing fixtures are locating guides that maintain all three operations in proper relationship to one another. Broaching is accomplished by a RD-624 pull-down broaching machine. A hydraulically actuated unloader deposits the completed parts onto a conveyor.

Use ACTION Card, opposite page 64. Encircle No. 81

This machine was built by Acme Broach Corp., Platt St., Milan, Mich., for producing the spiral rifling grooves in the 76 MM cannon barrel. The barrel itself is approximately 15' long; 13' of this length must have grooves cut in. The barrel is received and clamped by means of two split receiver bushings at the far end of the machine.

Use ACTION Card opposite Page 64. Encircle No. 82.



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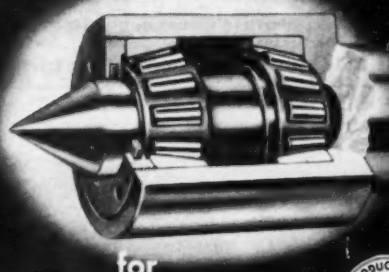
Falls ROTO CENTER



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

for lathe and grinder tail stocks

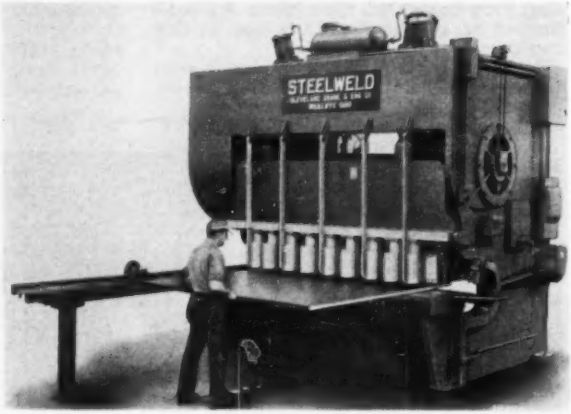
PRODUCTS Falls INCORPORATED

FREE BULLETIN 105 "What you should know about LIVE CENTERS"

FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

Heavy plate shear operates on pivoted-blade principle

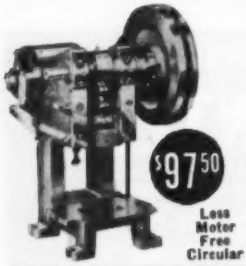
A Steelweld shear, Model No. 24G-8, designed for production shearing of steel plate in sizes up to 8′ long by 1½″ thick, has been completed by the Cleveland Crane & Eng. Co., 5240 E. 281st St., Wickliffe, Ohio.



End housings, crown and bed are welded into a solid one-piece unit. The end housings are provided with heavy, deep throat forgings that add to the frame strength and also increase the shearing possibilities, especially for certain angle cuts and slitting.

The machine operates on the pivoted-blade principle. The blade travels in a circular path without the use of guides and slides, thus eliminating a principal source of wear and shearing inaccuracies, it is claimed. Operating speed is 22 strokes per minute.

Use ACTION Card, opposite page 64. Encircle No. 83



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each plus scrap and salvage has been announced by Federal Products Corp., 1144 Eddy St., Providence, R.I.

Operating at a speed of 6000 to 8000 roller bearings per hour, it can be adjusted to handle bearings with diameters and lengths ranging from 3/16″ to ⅝″.

Use ACTION Card, opposite page 64. Encircle No. 82

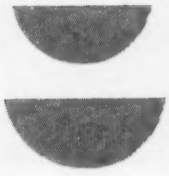
Facing machine offers high speed

The Thiel high speed facing machine is designed for grinding any facing operation on cold rolled, hot rolled, tool steels, steel castings and also nonferrous materials.

Equipped with a special 14″ cup grinding wheel, this machine will grind any surface perfectly flat and absolutely square within a few minutes, the manufacturer claims.

Optional equipment is the high speed facing head varying from 6″ to 14″. It rotates at grinding speed and is capable of removing ⅜″ of stock from nonferrous material with one quick stroke. The sur-

SPECIFY STANDARD



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For precision fitting, checking clearances, inspection and production work. Available in 12″ strips, ½″ wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015″ to .015″.

DESTACO DETROIT STAMPING COMPANY
347 MIDLAND AVENUE • DETROIT 3, MICHIGAN

face of this cut is claimed to require no finish cut. Eastown Tool & Engineering Co., Dept. BB, 23672 Schoenherr Rd., East Detroit, Mich.

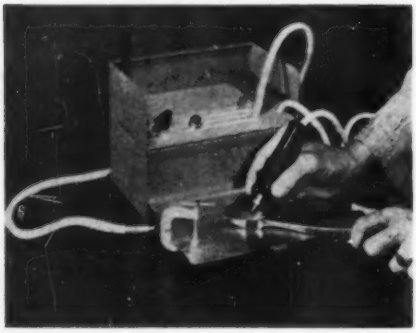
Use ACTION Card, opposite page 64. Encircle No. 85

Electric etcher marks tools, dies

Permanent marking of tools, dies, jigs, parts, materials, machinery and finished products of iron, steel and other metal alloys can be accomplished with the electric etcher from the Standard Electrical Products Co., Dept. B, 2240 E. Third St., Dayton, Ohio.

It consists of a light-weight etching tool with alloy-tip point, 5½′ cord and plug, ground clamp and extra flexible asbestos cables. Cooling air circulates around the tip. Depth of mark can be varied by use of any of four etching heats.

Use ACTION Card, opposite page 64. Encircle No. 86



Power feed cutting head attachment

Stone Machinery Co., Inc., 814 Fayette St., Manlius, N.Y., has announced a new development in power feed for the cutting heads of all chopstroke type Stone saws.

Operated by air with one control, this attachment, available either as an accessory for present saws or as optional equipment on all new Stone saws, is claimed to step up production, eliminate operator fatigue, and increase wheel life 10 to 25%, depending on metal cut. It enables a uniform cutting speed of four

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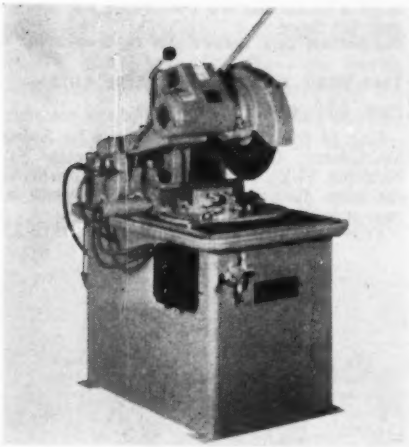
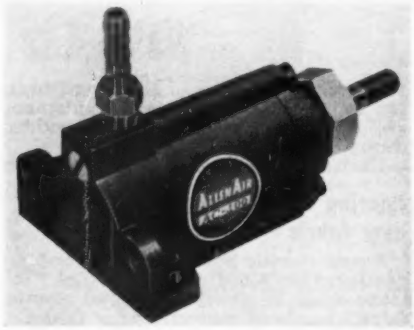


seconds per square inch of metal cut.
Use ACTION Card, opposite page 64. Encircle No. 87

Spring return air clamp

The A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N.Y., has announced a spring return air clamp, Model AC-1 x 1, of 1⅛ bore (one square inch area) and 1″ stroke. It features cast bosses for either horizontal or vertical mounting as well as a threaded nose piece.



There are two ⅛ n.p.t. tapped holes at 90° to each other for optional air inlet. One hole is plugged and the other fitted

Prevent DANGER OF MISALIGNMENT!

You can easily prevent danger of misaligning the work with the spindle on tapping and reaming jobs by taking one simple precaution. Use a Ziegler Floating Tool Holder which compensates for alignment inaccuracies of as much as 1/32″ radius or 1/16″ diameter.

Try it out and see how it simplifies making set-ups for tapping and reaming.

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13570 Auburn, Detroit 23, Mich.

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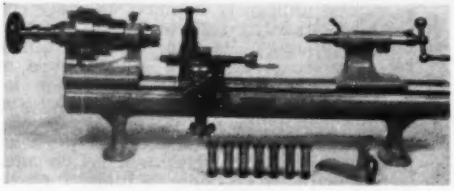
Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...



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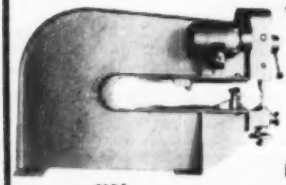

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15/64 inches
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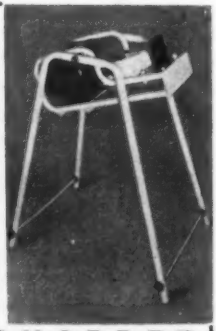

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Development Engineers, Inc.
21 High Street
Pawtucket 5, R.I.

ONLY $149.50 Complete

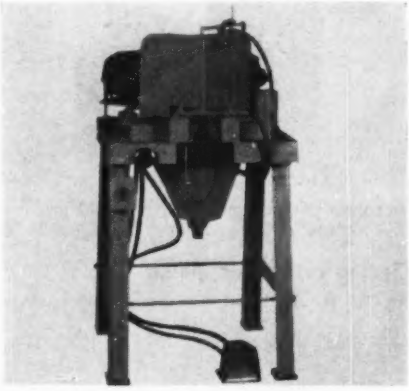
with a brass barbed connector for standard ¼" hose.

Use ACTION Card, opposite page 64. Encircle No. 88

Two-head mitering machine cuts two 45° miters at once

One of the new developments by Stone Machinery Co., Inc., 714 Fayette St., Manlius, N.Y., is their two-head mitering machine for cutting two 45° miters in one operation.

This machine is intended essentially



for cutting extrusions in aluminum, brass and copper. The cutting cycle is automatic and is activated by hand or foot-operated controls.

Use ACTION Card, opposite page 64. Encircle No. 89

Heating mantle made with new fabric

A new electric heating mantle for temperatures to 650 C, the Glas-Col "R," made from a newly developed mantle fabric, has been announced by Glas-Col Apparatus Co., Inc., Dept. MTB, 711 Hulman St., Terre Haute, Ind.

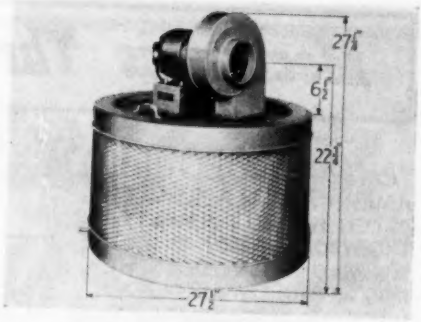
The fabric is claimed to be rugged, mechanically, and to easily withstand heavy usage. Its wear-resisting qualities make it practical to manufacture high temperature heating mantles for large kettles or receptacles used in pilot plants and production plants.

Applications for the new type heating mantle include: distillation of chemicals; vapor-phase cracking in tubes; high temperature drying and baking of enamels and paints; annealing glass, plastic, or metal; roasting and drying of catalysts; and heat treating of textiles.

Use ACTION Card, opposite page 64. Encircle No. 90

Increased suction plus a self-clearing paddle wheel type fan that can handle solids from wet machining operations are changes made in the Model VCS-2 Dustkop vapor collector by Aget-Detroit Co., 205 Main Street, Ann Arbor, Mich. The collector is usually located overhead so that the condensate may return by gravity to the sump of the machine.

Use ACTION Card, opposite page 64. Encircle No. 91



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Gives 20,000 lb. thrust using 1500 PSI line pressure as obtained from our hydraulic pumps. Will produce up to 40,000 lb. thrust with 3000 PSI. Can also be used on a low pressure air system. Has 4" bore; 18" stroke; 30½" long. Ideal for shop.

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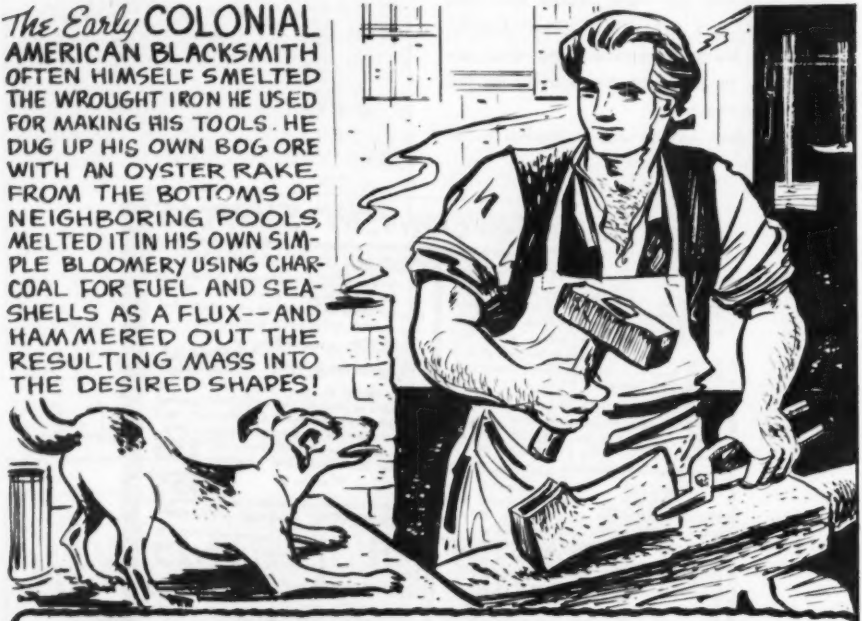
Mechanics Through The Ages

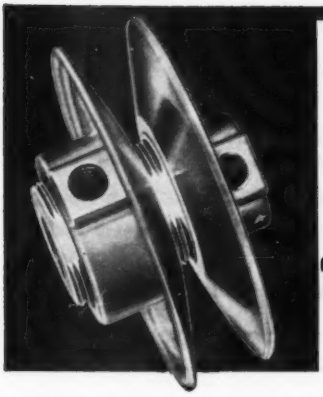
The Early COLONIAL AMERICAN BLACKSMITH OFTEN HIMSELF SMELTED THE WROUGHT IRON HE USED FOR MAKING HIS TOOLS. HE DUG UP HIS OWN BOG ORE WITH AN OYSTER RAKE FROM THE BOTTOMS OF NEIGHBORING POOLS, MELTED IT IN HIS OWN SIMPLE BLOOMERY USING CHARCOAL FOR FUEL AND SEASHELLS AS A FLUX--AND HAMMERED OUT THE RESULTING MASS INTO THE DESIRED SHAPES!



IMPORTED SPANISH IRON WAS SOLD AT MEDIAEVAL ENGLISH FAIRS BY SPANISH SALESMEN WHO HAWKED THEIR WARES IN COMPETITION WITH LOCAL MERCHANTS HANDLING IRON TURNED OUT BY NATIVE SUSSEX FORGES.

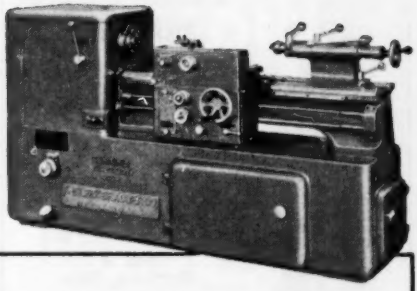
AL REETZ

HOWEVER, POOR HE MIGHT BE, EACH MEMBER OF THE HAMMERMAN'S GUILD OF 15th CENTURY EDINBURGH SCOTLAND, WAS ENTITLED TO HAVE HIS "DEID CHEST—(OR COFFIN) COVERED WITH THE GORGEOUS PALL OF THE GUILD!



More "Firsts" -Less "Seconds"

with the Amazing CRI-DAN "B" high-speed threading machine



Western Die Casting Co. threads and machines each section of this cast aluminum, variable speed pulley in 12 seconds on the Cri-Dan "B" threading machine.

On the male piece the operation involves boring the hole, facing the flange and threading to a length of one inch. Diameter of threaded portion is also one inch. The internally threaded piece is chamfered and threaded, thread length approximately ¾ inch.

Using the Cri-Dan "B" results in more "first rate" pieces, fewer rejects in less time than had been possible previously.

Yes, Cri-Dan "B", using a single carbide-tipped tool, has established new standards for accurate, fast precision threading.

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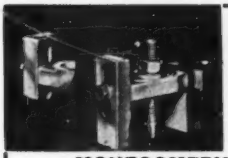

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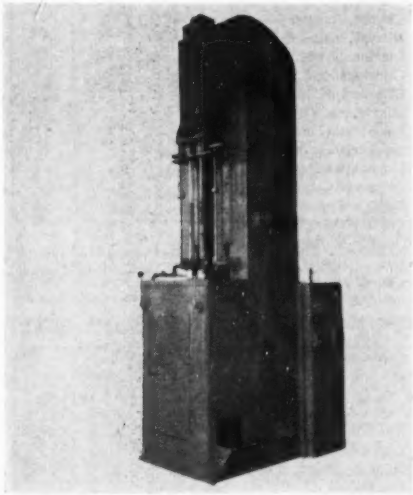

cylinder stroke and the main cutting cylinder stroke are adjustable for various lengths of broaches, and since the entire upper retriver slide and cylinder assembly may be moved downward between guide bars and relocated, broaching tools of many lengths may be used.

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PRODUCTS INDEX

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A

Abrasive Belt Machines, 341
Abrasive Cloth, Paper, Discs, Wheels, Stones, Belts, etc., 36, 112, 113
Accumulators, 369
Adapters, 32, 72, 80, 81, 248
Angle Plates, 361
Arbor Spacers, Shim Stock, 98

B

Balancing Service, 350
Balancing Tools, 33
Bar Feeds 91, 271
Bars, 43, 115
Bases, radial drill, 339
Bearings, 16, 100
Bearings, ball, 100
Bearings, roller, 100
Bearings, thrust, 337
Benches, work, 88
Bending Equipment, 53, 54, 152
Blades, hack saw, Inside front cover
Blades, work support, 248
Bolts, 340
Boring Heads, 129
Boring Machines, 123, 129
Boring Tools, 70, 85, 114
Brakes, press, bending, 235
Broaches, 99, 295
Broaching Machines, 127
Buffing Machines, 185
Burrs, 12
Bushings, 15, 326, 353
Bushings, drill jig, 235, 320

C

Calipers, 205, 289, 335
Cam Milling, 346
Cams, 279, 289, 346
Carbide Stock, 60, 61
Center Measuring Instruments, 33
Centers, bench, 33
Centers, lathe, 363
Centers, live, 56, 197, 262, 280
Chamfering Tools, 70
Chasers, 231
Chucks, 69, 172, 177
Chucks, air-operated, 177
Chucks, collet, 366
Chucks, drill, 69, 98
Chucks, lathe, 379
Chucks, scroll, 379
Clamps, 4
Clamps, fixture, 254
Clamps, strap, 4
Clamps, T-slot, 4
Clinchers, 107
Clutches, 68, 377
Collets, 80, 81, 119, 197
Comparator, microfinish, 269
Comparators, dial, 54
Comparator Gage, 306
Compounds, tapping, 340
Coolant Systems, 278
Counterbores, 70, 80, 81
Couplings, flexible, 244
Cut-off Blades, 39
Cut-off Machines, 89, 262
Cutters, 77, 129, 188, 189, 262
Cutters, keyseater, 232
Cutting Fluid, Oils, 218
Cylinders, hydraulic, pneumatic, 128, 177

D

Dial Indicators, 74, 122
Diamond Tools, 136, 137, 335
Die Button, 55
Die Heads, 231
Die Sets, 17, 144, 289

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5	1.00	6	3 3/8	35	.70	5 1/8	3
6	1.00	6	3 3/8	36	.70	4 3/8	2 1/2
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23	.80	5 3/8	3 1/4	53	.50	3	1 3/4
24	.80	5 3/8	3 1/4	54	.50	3	1 3/4
25	.80	5 3/8	3 1/4	55	.50	3	1 3/4
26	.80	5 3/8	3 1/4	56	.50	2 1/4	1 1/8
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DEALER INQUIRIES INVITED

SID TOOL CO., INC.

126 LAFAYETTE STREET
NEW YORK 13

Dies, 82, 130
Dies, perforating, 130
Dies, progressive, 187
Dies, press brakes, 235
Draw Bars, 197
Drill Heads, 118, 247, 287, 322
Drill Table, 84
Drilling Attachments, 71, 289
Drilling Attachments, multiple spindle, 247
Drilling Equipment, 32
Drilling Information, 56
Drilling Machines, 71
Drilling Machines, bench, 31, 274
Drilling Machines, precision, 173
Drilling Machines, radial, 40, 134, 180
Drilling Units, 362
Drills, 148, 217, 375
Drills, center, 232
Drills, high speed, 252
Drills, twist, 18, 19
Drivers, tap, 32
Drives, speed, 271
Duplicating Attachments, 66
Dust Control, 30, 289
Dye, layout, 262

E

End Mills, 124, 210
Engravers, 65
Ejectors, 80, 81
Extractors, pipe & stud, 253
Extractors, tap, 253

F

Facing Heads, 306
Face Plate Jaws, 177
Facing Tools, 70
Feed, drill press, 1
Feeders, parts, 268
Feeds, press, 20
Feeds, roll, 20, 26, 256, 272
Feeler Gage Stock, 365
Files, 75
Files, oilstone, 211
Fixtures, 233
Flanging Machines, 360
Flame Hardening Machines, 87
Flexible Shaft Equipment, 44, 321
Flexible Shaft Machines, 37
Forming Machines, 109
Fullers Earth, 306
Furnace, electric, 307
Furnaces, heat-treating, 76, 229, 332, 354
Furnaces, industrial, 76, 174, 331

G

Gage Blanks, 295
Gage Blocks, 35, 83, 121, 201, 326
Gages, dial, 122
Gages, dial bore, 122
Gages, groove, 214
Gages, internal, 23, 214
Gages, micrometer, 266
Gages, plug, 122, 325
Gages, ring, 325
Gages, snap, 122
Gaging Equipment, 151, 295
Gear Shapers, 110, 111
Gears, 225, 338
Gears, helical, 225
Gears, worm, 225, 338
Gibs, 143
Grinders, 42, 339
Grinders, abrasive belt, 342
Grinders, air, 250, 317
Grinders, carbide tool, 42
Grinders, cylindrical, 106
Grinders, disc, 6, 185, 295
Grinders, drill, 97
Grinders, internal, 106
Grinders, jig, 226
Grinders, pedestal, 42
Grinders, precision, 388
Grinders, surface, 59, 178, 190, 343
Grinders, tap, 266
Grinders, tool & cutter, 102, 106, 123
Grinding Services, 387
Grinding Wheels, 101, 112, 113, 207

H

Hammer, hinged molds, 349
Hammers, lead, 349
Hardness Testing Equipment, 346
Hinges, 336
Hob Sharpeners, 188, 189
Hobbing Machines, 169, 188
Hoists, 326
Holders, cut-off blade, 126
Holders, floating drill, 93
Holders, tool, 93, 126, 253
Holders, wheel, 126
Honing Machines, 383
Hydraulic Equipment, 369

I

Index Fixtures & Tools, 233, 273
Indicators, surface, 63
Inserts, carbide, 284

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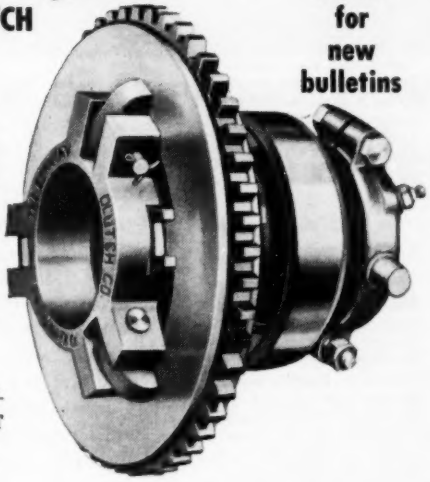

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J

Jacks, 4
Jig Borers, 226

K

Keys, woodruff, 365
Keyseaters, 262, 346
Knurling Tools, 73

L

Lapping Machines, 41
Lapping Plates, 361
Lapping Service, 10
Lathes, 132, 133
Lathes, automatic, 71
Lathes, bench, 2, 102, 367
Lathes, duplicating, Inside back cover
Lathes, engine, toolroom, 123
Lathes, floor, 102, 132, 133
Lathes, precision, 52, 298
Lathes, speed, 54
Lathes, tool, gage-makers, 2
Lathes, tracer, 242
Lathes, turret, 21, 95, 102, 231
Lathes, vertical turret, 123
Lubricants, 13, 353
Lubricators, fog, 251

M

Magnifiers, binocular, 369
Mandrels, expanding, 255
Mandrels, lathe, 98, 232
Marking Devices, Stamps, 350, 366
Marking Equipment, 366
Marking Machines, 350
Measuring, Checking Equipment, 216, 356
Metallizing, 94
Micrometers, 205, 348
Milling Cutters, 77, 104
Milling Heads, 14, 22
Milling Machine Attachments, 46, Back cover
Milling Machines, 8, 9, 277
Milling Machines, horizontal, 123
Milling Machines, vertical, 105, 123
Motors, electric, 79

N

Nibbling Machines, 368
Numbering Heads, 34
Nuts, 248

O

Optical Inspection Devices, 212, 289

P

Pads, 266
Pantographs, 65
Perforators, 357
Perforator, grinding, 27
Pins, 289
Planer, carbide, 11
Plastic Tools, 90
Porting Tools, 267
Presses, 45, 318
Press Brakes, 48, 49, 92
Presses, arbor, 67
Presses, deep-throat, 334
Presses, drill, 102, 239, 245
Presses, gap type, 67
Presses, guilded platen, 67
Presses, hand, 67
Presses, horn, 334
Presses, hydraulic, 67, 338, 369
Presses, movable frame, 67
Presses, O.B.I., 3
Presses, power, 58, 67
Presses, punch, 318, 364
Presses, special, 154
Profiling Machines, 2
Pumps, coolant & lubricant, 278
Pumps, hand, 369
Pumps, hydraulic, 369
Punches, 82
Punches & Dies, 82

R

Racks, 338
Reamers, 148, 188, 189, 232
Recessing Tools, 64
Reciprocating Tools, 286
Rivet Setters, 96, 107
Riveting Machines, 338, 347
Riveting assembly service, 343, 347
Roll Feeds, 20, 26, 256, 272
Rules, steel, 216

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S

Safety Devices, 285
Saw Blades, band, 179
Saw Blades, hack, Inside front cover, 179
Sawing Machines, 78, 86
Sawing Machines, band, 249, 283
Sawing Machines, friction, 78
Sawing Machines, hack, 346
Saws, carbide-tipped, 46
Saws, circular, 46
Saws, metal-cutting, 46, 78, 249, 283
Scrap Cutters, 368
Screw Drivers, power, 336
Screw Machines, automatic, 125
Screw Machines, hand, 2
Screws, 7, 240, 241, 279, 340
Screw Sets, 56, 340
Screws, cap, set, socket & machine, 240, 241
Shanks, Morse taper, 120
Shapers, 123
Shapers, bench, 102
Shearing Machines, 24, 25, 330
Shears, hand, 346
Shears, throatless, 359
Sine Bars, 351
Sine Plates, 351
Sleeves, 16, 80, 81, 321
Slide Assemblies, 263
Slitting Cutters, 143
Slitting Machinery, 368
Slotters, 359
Socket Screw Products, 155
Sockets, 72, 80, 81
Spacers, 143
Special Machinery, 180, 344, 368
Special Tools, 70, 344
Spindle Assemblies, 32
Spindle Extensions, 32
Spindles, 32, 38, 57
Spring Collets, 213
Staking, service, 343, 347
Stampings, 15
Steel Blue, 344
Steel and Steel Stock, 43, 116, 117, 156
Straight Edges, 361
Studs, 340
Surface Plates, 361, 364

T

T-Slot Bolts, 4
T-Slot Nuts, 4
Tables, drill, 84, 339
Tables, elevating, adjustable, 171, 266
Tables, rotary, index, 333
Tap Units, 362
Taper, Morse, 289
Tappers, 328
Tappers, hand, 346
Tapping Attachments, 98
Taps, 248
Thread Grinding, 146
Thread Milling Machines, 306
Threading Machines, 371
Threading Tools, 56, 146
Tool Bits, 355
Tool Control, 103
Tool Heads, 326
Tool Holders, 80, 81, 367
Toolmakers' Knees, 361
Tool, steel, 50, 51, 116, 117
Tools, Dies, 361, 385
Tools, cutting, 341
Tools, hand, 186
Tools, plastic, 90
Tote Pans, 338

V

Valves, 128
Valves, air, 140, 327
Vises, air powered, 108
Vises, bench & machine, 54, 84, 98, 120, 262, 342
346

W

Washers, 319
Ways, 358
Ways, balancing, 358
Ways, bronze hardened, 143
Wear Strips, 143
Welding Equipment & Supplies, 337, 345
Wipers, industrial, 28, 29
Wrenches, 329
Wrenches, power, 177

Index to Advertisers

A

A & J Tool Company 289
Ace Drill Bushing Company, Inc. 235
Acme Danneman Company, Inc. 289
(Danneman Die Set Div.)
Acme Industrial Company 352
Acme Tool Company 287-361
Acme Wire & Iron Works 382
Acorn Bearing Company 337
Acromark Company 350
Aget-Detroit Company 289
Air Transport Equipment, Incorporated 342
Alina Corp. 335
Allegheny-Ludlum Steel Corporation 50-51
Allen, Alva F. 364
Allied Products Corporation 55
American Cam Company 64
American Chain and Cable Company 265
(Campbell Machine Division)
American Standard Perforators 357
American Tool Works Company ....Inside Back Cover
Ames Company, B. C. 74
Anderson Bros. Manufacturing Company 358
Apex Machine and Tool Company 72
Apex Tool and Cutter Company 355
Armstrong-Blum Mfg. Co. .....Inside Front Cover
Armstrong Brothers Tool Company 4
Arrow Tool and Reamer Company 210
Arter Grinding Machine Company 106
Atlas Equipment Company 326
Atlas Press Company 52
(Clausing Division)
Atrax Company 12
Auto Moulding and Manufacturing Company 336

B

Bald Eagle Tool Company 351
Baldor Electric Company 42
Baptist Machine Company 269
Barber-Colman Company 188-189
Bathey Manufacturing Company 338
Beaver Gear Works, Inc. 338
Behr-Manning Corporation 211
Bellows Company 1
Benchmaster Manufacturing Company 20
Beverly Shear Manufacturing Company 359
Blanchard Machine Company 101
Blue Valley Machine & Mfg. Company 360
Boggis and Company, Henry P. 266
Bremil Manufacturing Company 346
Brown Corporation, W. R. 108
Brighton Screw & Manufacturing Company 155
Brown & Sharpe Manufacturing Company 125
Brush Electronics Company 63
Bryant Chucking Grinder Company 214
Buck Tool Company 379
Busch Company, J. C. 364

C

Campbell Machine Division 265
(American Chain and Cable Company)
Carborundum Company 112-113
Carlton Machine Tool Company 40
Carroll and Jamieson Machine Tool Company 54
Challenge Machinery Company 88
Chandler Tool Company 326
Chicago Latrobe 148
Chicago Manufacturing & Distributing Company ...353
Chicago Quadrill Company 245
Chicago Rivet and Machine Company 96
Cimcool Division 218
(Cincinnati Milling Machine Company)
Cincinnati Bickford Tool Company 134
Cincinnati Milling Machine Company 8-9
Cincinnati Milling Products Division 207
(Cincinnati Milling Machine Company)
Cincinnati Shaper Company 24-25
Cincinnati Sub-Zero Products Company 94
Circular Tool Company 46
Cleveland Instrument Company 266
Clipper Diamond Tool Company 335
Colonial Broach Company 127
Columbus Die-Tool and Machine Company 344
Comet Tool Company 56
Comtor Company 23
Conical Tool Company 217
Connors and Davis Sales Corporation 213
Consolidated Machine Tool Corporation 97
Continental Tool Works 99
(Division Ex-Cell-O Corporation)
Conway Clutch Company 377
Cook and Chick Company 336
Cook and Sons, Inc., Philip 356
Cooley Electric Manufacturing Corporation 229
Criterion Machine Works 114
Cross and Son, Herbert 56
Cross Company 103
Crucible Steel Company of America 116-117
Cunningham Company, M. E. 366
Cushman Chuck Company 177

D

D & M Guard Company 285
Dake Engine Company 67
Danly Machine Specialties, Incorporated 17
Danneman Die Set Div. 289
(Acme Danneman Co.)
Davis Boring Tool Division 120
(Giddings and Lewis Machine Tool Company)
Davis Keyseater Company 262
Dayton Rogers Manufacturing Company 373
Dearborn Gage Company 201
Detroit Die Set Corporation 144
Detroit Stamping Company 365

Detroit Tap & Tool Company 246
Dreis & Krump Manufacturing Company 235
Dykem Company 344

E

Economy Tool and Machine Company 248
Eisler Engineering Company, Incorporated 333
Electro-Mechano Company 239
Electronic Dynamic Balancing Company 350
Ellstrom Standards Division 201
(Dearborn Gage Company)
Empire Tool Company 39
Ex-Cell-O Corporation 99
(Continental Tool Works Div.)

F

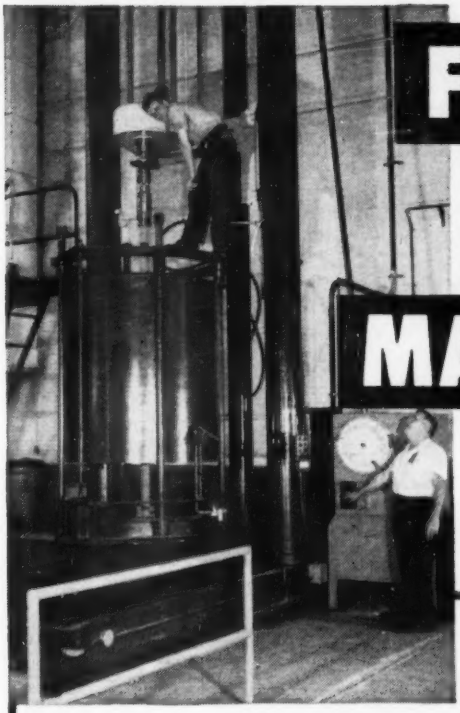
Fairfield Gauge Company 266
Falcon Tool Company 385
Falls Products, Inc. 363
Fellows Gear Shaper Company 110-111
Fen Machine Company 329
Firth-Sterling, Inc. 60-61
Franklin-Balmar Corporation 37
(N. A. Strand Division)
Fulmer Company, C. Allen 383

G

Galland-Henning Nopak 128
Gardner Machine Company 6
Garreau and Company 306
Gatco Rotary Bushing Company 326
Giddings and Lewis Machine Tool Company 129
(Davis Boring Tool Division)
Gilman, Inc., Russell T. 263
Gisholt Machine Company 95-223
Glenzer Company, J. C. 83
Grant Manufacturing & Machine Company 338
Gray Company, G. A. 11
Greaves Machine Tool Company 47
Greenerd Arbor Press Company 338
Green Instrument Company 65
Greenlee Brothers & Company 126

H

Hall Manufacturing Company 366
Hamilton Tool Company 169-171-173



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Hammond Machinery Builders 339-341
Hardinge Brothers, Inc. .....Back Cover
Harig Manufacturing Corporation 27
Heimann Manufacturing Company 56
Hendley and Whittemore Company 330
Hevi Duty Electric Company 76
High Speed Hammer Company 343-347
Himoff Machine Company 346
Hisey-Wolf Machine Company 388
Hollow Boring Corporation 372
Huppert Company, K. H. 331
Huron Machine Products 295
Hypneumat, Inc. 56

J

Jahn Manufacturing Company, B. 187
Johansson Gage Company, C. E. 151
Johnson Bronze Company 16
Johnson Gas Appliance Company 332
Johnson Manufacturing Corporation 86
Jones & Lamson Machine Company 231

K

Kalamazoo Tank and Silo Company 249
(Machine Tool Division)
Kasson Die & Motor Corporation 197-337
Kennametal, Inc. 341
Kent-Owens Machine Company 277
Keo Cutters 232
Kidde Prec. Tool Corporation 289-346
King, Andrew 346
Kitzman Manufacturing Company 349
Kling Brothers Engineering Works 78

L

L & J Press Corporation 318
L-W Chuck Company 346
Lamina Dies and Tools, Inc. 15
Landis Machine Company 146
Lassy Tool Company 346
LeBlond Machine Tool Company, R. K. 132-133
Lee Company, K. O. 255
Lees-Bradner Company 371
Levin & Son, Louis 252
Linde Air Products Company 87
Linley Brothers Company 347
Lipe-Rollway Corporation 91
Littell Machine Company, F. J. 256
Lovejoy Flexible Coupling Company 244
Lucifer Furnaces, Inc. 207
Lufkin Rule Company 216

M

M. B. Manufacturing Company 266
Machine Tool Publications 373
Madison-Kipp Corporation 317
Martin Machine Company, J. E. 346
Masters 372
MBI Export & Import, Ltd. 98
McCrosky Tool Corporation 70
Meiin Tool Company 124
Michigan Chrome & Chemical Company 262
Midwest Tool & Engineering Company 266
Millers Falls Company 179
Modern Machine Tool Company 84
Modern Tool Works 97
(Div. Cons. Mch. Tool Corp.)
Montgomery & Company 373
Moore Special Tool Company 226
Morris Machine Tool Company 180
Morse, Roger 372
Morse Twist Drill & Machine Company 18-19
Morton Machine Works 254
Mummert-Dixon Company 306

N

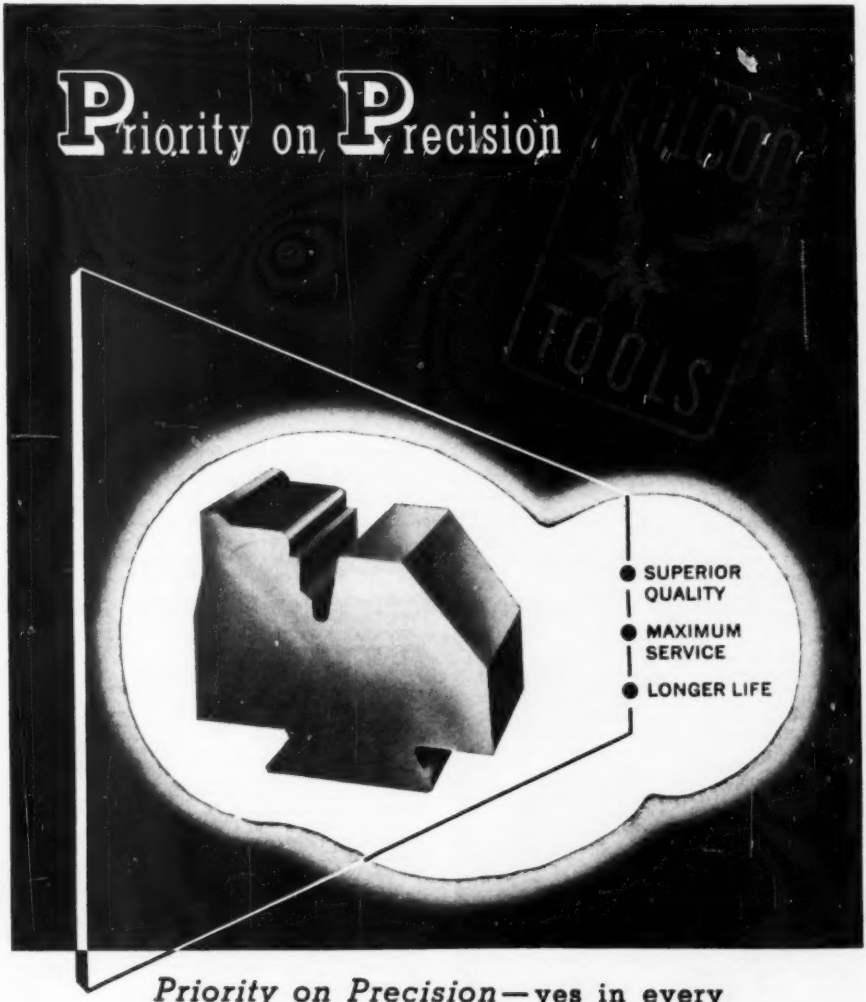
National Tool Company 225
New Britain Tool and Manufacturing Company 262
Newcomer Products, Inc. 284
New Hermes Engraving Machine Corp. 325
Niagara Machine and Tool Works 48-49
Nicholson and Company, W. H. 327
Nicholson File Company 75
Nielsen, Incorporated 262
Nilson Machine Company, A. H. 109
Noble and Westbrook Manufacturing Company 34
Norgren Company, C. A. 251
Norma-Hoffman Bearings Corporation 100
Northeastern Development Engineers 368
Norton Company 10-41
Nu-Tangs, Inc. 289

O

O. K. Tool Company 372
Ohio Knife Company 143
Oliver Instrument Company 31
Oliver Machinery Company 295
O'Neil-Irwin Manufacturing Company 152
Onsrud Machine Works, Inc. 250
Ottemiller Company, Wm. H. 340

P

Palley Supply Company 369
Parker Machine Company 123
Pedrick Tool and Machine Company 53
Pellow Machine Company 190
Pereny Equipment Company 354
Perkins Machine Company 45
Pilot Tools, Inc. 321
Plunket Machine Company, J. E. 54
Pope Machinery Corp. 38
Portland Machine Tool Works, Inc. 14
Pratt & Whitney 77
Precise Products Corporation 186



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Precision Tool & Manufacturing Co. 85
Procunier Safety Chuck Company 328
Pyrometer Instrument Company 289

Q

Queen City Machine Tool Company 185

R

R and L Tools 73
Racine Hydraulics and Machinery, Inc. 89
Reading Machine Company 346
Ready Tool Company 279
Rehnberg-Jacobson Manufacturing Company 362
Reid Brothers' Company, Incorporated 178
Richards Company, J. A. 54
Ring Punch & Die Co. 82
Rivett Lathe and Grinder, Inc. 21
Rockford Clutch Division 68
Rockford Machine Tool Company 66
Roll Feeds Corporation 272
Ross Operating Valve Company 140
Rotor Tool Company 93
Rusnok Tool Works 22
Ruthman Machinery Company 278
Ryerson and Son, Incorporated, Joseph T. 156

S

Sales Service Machine Tool Company 58
Sanford Manufacturing Corporation 59
Scherr Company, Inc., George 54-212-289-326-348
Scott Paper Company 28-29
Scully-Jones and Company 80-81
Seibert and Sons, Inc. 32
Sellew Machine Tool Company 287
Seneca Falls Machine Company 71
Sentry Company 174
Service Machine Company 334
Severance Tool Industries 387
Shearcut Tool Company 295
Sheffer Collet Company 119
Sheldon Machine Company 298
Sidney Machine Tool Company 242
Sid Tool Company 375
Sigourney Tool Company 274
Skinner Chuck Company 172
Smith and Sons, Inc., G. W. 229
Smith Tool and Engineering Company 340
Smith Welding Equipment Corporation 345
Snow Company, F. J. 339-343
Sonnet Tool and Manufacturing Corporation 104
South Bend Lathe Works Inc 102
Standard Gage Company 122
Standard Pressed Steel Company 240-241
Standard Steel Specialties, Inc. 365
Stark Tool Company 367
Starrett Company, The, L. S. 205
Stone, Guthrie B. 373
Stow Manufacturing Company 44
Strong, Carlisle and Hammond Company 7
Sturdimatic Tool Company 280
Sundstrand Machine Tool Company 33
Sun Oil Company 13
Supreme Products, Inc. 69
Swanson Tool and Machine Products, Inc. 273
Syntron Company 268

T

Tamms Industries, Incorporated 306
Tech-Pacific Corporation 368
Thriftmaster Products Corporation 322
Tomkins-Johnson Company 107
Torit Manufacturing Company 30
Tree Tool and Die Works 165

U

United States Drill Head Company 247
U. S. Steel Supply Div. 43-115
Universal Engineering Company 320

V

V and O Press Company 8
Van Keuren Company 35
Verson All Steel Press Co. 92
Vulcan Tool Company 90

W

Wade Tool Company 2
Walls Sales Corporation 342
Waltham Machine Works 306
Walton Company 253
Wardwell Manufacturing Company 253
Watts Brothers Tool Works 289
Webber Gage Company 121
Weldon-Roberts Rubber Company 36
(Brightboy Industrial Division)
Wells and Sons, W. F. 271
Wells Manufacturing Corporation 283
Westfield Gage Company 295
Wetmore Tool and Engineering Company 267
Wheel Trueing Tool Company 136-137
Whistler and Sons Company, S. B. 130
Whitehead Stamping Company 319
Whitnon Manufacturing Company 57
Willey's Carbide Tool Company 248
Wilton Tool Manufacturing Company 120
Wisconsin Drill Head Company 118
Wittek Manufacturing Company 26
Woods Machine Company, S. A. 79

Z

Zagar Tool, Inc. 233
Ziegler Tool Company, W. M. 367

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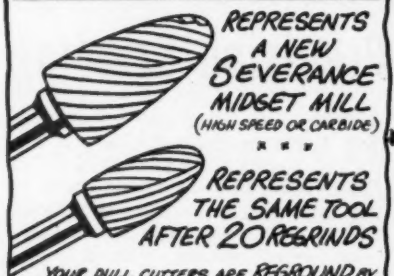

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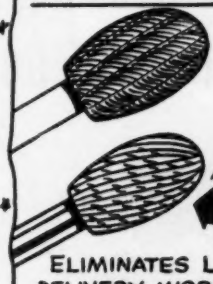

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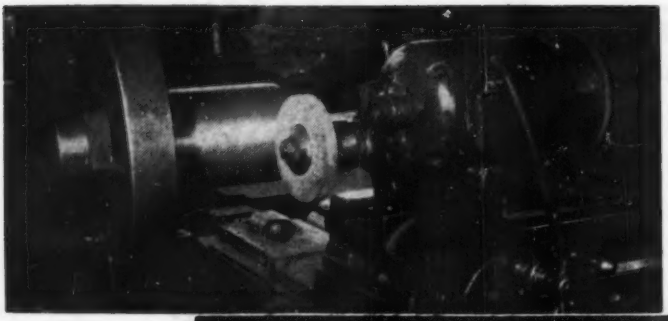

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(Wheel Guard removed for clarity)

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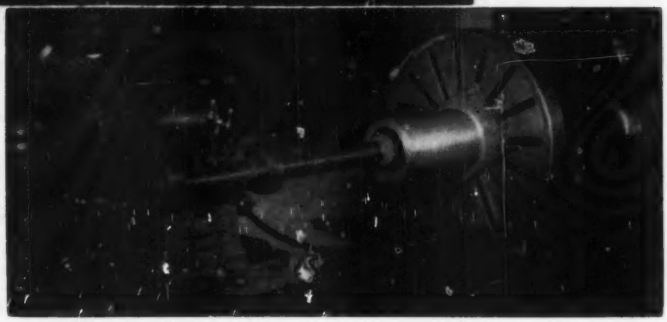

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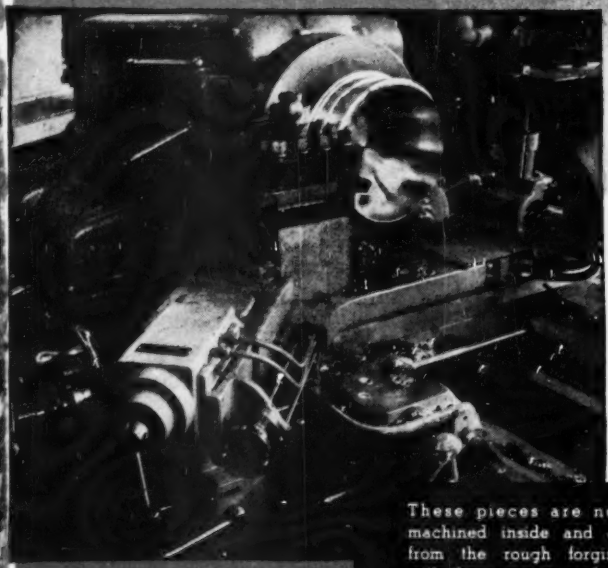

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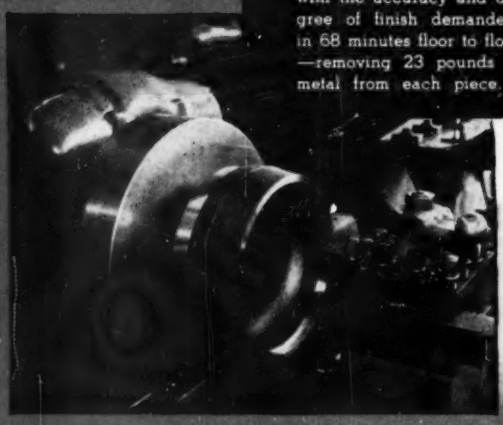

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